					ц	Tra	ffic L	ight		
	JAB chem	Unit 1.2	a Periodic Tab	ole & Atomic S	Structure	JAB chem	Lesso	Red	Amber	Green
6 7	The elemen • Met • Gro elec	ts of the Perioc al elements are ups (columns) trons, indicated	lic Table are arranged on the left side and r on the Periodic Table d by the group numbe	d in order of increas non-metals element contain elements w er on the Periodic Ta	ing atomic nui s are found on vith same num able	mber: the right sid ber of outer	le	8	٢	3
8	Elements v properties Gro	vithin the sam as they have 1p Number /alency	the group have the sate the same number of 1 2 3 1 2 3	ame valency and h f electrons in their 4 5 4 3	ave similar c outer electro 6 7 2 1	hemical on shell. 0 0		8		3
9	The electro 1 st Energy 1 2 electrons Arra	n arrangement Level holds 2 trons ngements of the fi	of the first 20 elemen nd Energy Level holds 8 electrons irst 20 elements are found	nts can be written. 3 rd Energy Level holds 8 electrons on page 6 of the data be	s 4 th Energy 8 elec	Level holds strons		8	•	:
10	Every elen particles c • eac pro • ele of	- electron shel (energy level) electron nucleus positively charged)	1	8		0				
11	ParticleLocationChargeMassProtonNucleus+11 amuNeutronNucleusNeutral1 amu									\odot
12	The atomic	number of an	element is equal to the	he number of proto	ns.			\approx	<u></u>	\odot
13	Atoms are <i>r</i> The mass n	<i>eutral</i> because umber of an at	tom is equal to the nu	e numbers of protor Imber of protons plu	is and electror	IS		$\overline{\mathbb{R}}$	···	\odot
14	Isotopes are o the o the Most eleme	e atoms of the s same atomic nu same number c nts have more	same element which h umber but a <i>different</i> of protons but a <i>differ</i> than one isotope and	nave: mass numbers ent number of neuti an element is a mixt	rons ure of the differ	rent isotopes		8) ()
15a	The numbe Number o Number o Number o	mas atomic of protons, ne f protons = at f neutrons = m f electrons = m	s number c number eutrons and electrons omic number ass number – atomic umber of protons (for	²³ Na can be found from t number = 23 - r neutral atoms only	symbol the atomic no. = 11 - 11 = 12 y) = 11	and mass no).	$\overline{\mathbf{S}}$		0
15b	The numbe Number o Number o Number o	and mass no).	8		0				
16	Relative ato	mic mass is the I is rarely a wh I of Chlorine is loser to 35 than	e average atomic mas ole number because 3 35.5 (The two chlori n 37 there must be m	s of all the isotopes it an average of diffe ne isotopes are ³⁵ Cl ore ³⁵ Cl atoms in sa	of an element erent masses and ³⁷ Cl) mple than ³⁷ Cl	atoms		$\overline{\mbox{\scriptsize (s)}}$		٢

Na	Nat5 Past Paper Question Bank JARchem														
Traffic	Lights	Uni	t 1.2	2a Po	erioc	dic T	able	& A	tom	ic St	truct	ture		ne	F F (
Outcome	<u>Original</u>	<u>New</u> Specimen	<u>Nat5</u>	<u>Nat5</u>	<u>Nat5</u>	<u>Nat5</u>	<u>Nat5</u>	<u>Nat5</u>	Nat5	Nat5					
Curcome	Paper	Paper	<u>2014</u>	2015	2016	<u>2017</u>	<u>2018</u>	<u>2019</u>	2020	2021					
67								mc3							
8															
9					mc3										
10															
11	mc2	mc2			L1a(i) L1a(ii)		mc2								
12															
13															
14	L2a	L2a	L1b(ii)	mc2		L1a									
15a	L2b	L2b	L1b(i)	mc1	L5b	mc2 L1b	L6b								
15b	mc5	mc5		mc3				mc4							
16	L2c	L2c			L1b	L1c	L6a(i) L6a(ii)								
Marking Scheme	Back of Paper	Back of Paper	SQA Nat5 2014 Msch	SQA Nat5 2015 Msch	SQA Nat5 2016 Msch	SQA Nat5 2017 Msch	SQA Nat5 2018 Msch	<u>SQA Nat5</u> 2019 Msch							

Nat5	Answer	% Correct			Reasoning									
2015			Atomic numbe	er = number	of protons	atomic nu	imber = 26							
1	A	92	Mass number	= number o	f protons + numbe	er of neut	rons							
1	•••	-			.:.	mass num	ber = 26 + 3	30 = 56						
2015 2	В	88	Isotope Definition: ⊠A W and X ha ⊠B W and Y ha ⊠C X and Y hav ⊠D Y and Z ha	same at ave differen ive same nun ve different ve different	umber of protons tomic number t numbers of proto uber of protons but numbers of proton numbers of proton	differ ns∴Wan different s∴Xand s∴Yand	number o mass num d X not isoto numbers of 1 Y not isotope Z not isotope	f neutrons Nber pes neutrons 25 25						
2015			EA Cl ⁻ ions hav	ve an electro	n arrangement of 2	,8,8								
2010	D	67	EB St ions have	/e an electro	on arrangement of 2	2,8,8								
3	U	01	⊠C Ar atoms n ⊠D Nations ha	IC Ar atoms have an electron arrangement of 2,8,8										
			ED Na lons na EA electrons h	nave nealiaib	le mass so removal	of electro	n has no effe	ct on mass no						
2016	5	10	⊠B no change t	to the numbe	er of protons so atc	mic numbe	r is unchange	2d						
3	D	48	EC no change t	C no change to the number of protons so charge of nucleus is unchanged										
-			☑D atom X (e.g	. Na 2,8,1) bec	omes ion X^{\star} (e.g. Na *	2,8) loses a	n occupied er	nergy level						
2017			⊠A if atomic n	umber = 24	then number of pro	tons = 24								
2017	C	90	⊠B if atomic n	umber = 45 1	then number of pro	tons = 45	·····							
۷	•		\bowtie atomic number = no of protons = 21 and mass no.= protons+neutrons = 21+24 = 45 \bowtie b if atomic number = 24 then number of protons = 24											
				Particle	Location	Charge	Mass							
2018	D			Proton	in nucleus	+1	1 amu							
2	В	-		Neutron	in Nucleus	0	1 amu							
				Electron	outside nucleus	-1	Approx O							
2010			🗵 A All elemen ⁺	ts in group 1	have 1 electron in i	ts outer sł	nell							
2017	C	_	⊠B All element	s in group 2	have 2 electrons in	its outer :	shell							
3	V		✓C All element	's in group /	have / electrons in	its outer :	shell	م منطقة مام ما						
			ED All element	rs in group o	charge as it has my	nave o e	ne then prote	s outer shell						
2019	~		B This atom I	nas no chara	e as it has equal nu	mbers of p	rotons and el	ectrons						
4	D	-	⊠C This atom I	has no charg	e as it has equal nu	mbers of p	rotons and el	ectrons						
•			🗹 D This ion ha	s a 2+ positi	ve charge as it has	2 less elec	trons than pr	rotons						

Nat5	Answer	Reasoning									
2014	79	Number	of protons	= atomic n	umber	= 79					
11	79	Number	, of electron:	s = atomic n	umber - cha	rge = 79 -	0 = 79				
ID(i)	118	Number	of neutrons	= mass no	- atomic no.	= 197	- 79 = 118				
2014			atomic num	ber		mass numbe	r				
1b(ii)	Answer from:	Same	number of p	bu brotons	t different	number of r	eutrons				
			Particle	Location	Charge	Mass					
2016	1		Proton	in nucleus	+1	1 amu					
1a (i)	0		Neutron	in nucleus	0	1 amu					
			Electron	outside nucleu	s -1	approx zero					
2016			Particle	Location	Charge	Mass	_				
4	Electron -1		Proton	in nucleus	+1	1 amu					
1a (ii)			Neutron	in nucleus		1 amu					
201/		Deletive etc		upprox zero							
2016	14 5	element in c	elative atomic mass is the average mass of the different isotopes of the same lement in a sample. As there are equal quantities of ¹⁴ N and ¹⁵ N in the sample								
1b	11.5	the RAM is	halfway beti	ween 14 and 15.			ne sumple,				
2016		Mass numbe	Nass number = 197 (from passage) Atomic number = 79 (from data booklet)								
5h	118	Number of	neutrons = m	lass number - ato	omic number	= 197 - 79 = 11	3 neutrons				
2017			atomic number made number								
4	Isotopes	Same	atomic num	ber bu	t different	mass numbe	r				
la	·		number of p	protons		number of r	eutrons				
			Isoto	ope Protons	Neutrons	Electrons					
2017	Different number of		³⁶ A	r 18	36-18 = 18	18					
1b	neutrons in each		³⁸ ₁₈ A	r 18	38-18 = 20	18					
			40 18 A	r 18	40-18 = 22	18					
2017		Relative ato	omic mass is ·	the average mas	s of the diffe	erent isotopes	of the same				
1.	36	element in a	a sample. As	the average mas	s is 36.2 of is	sotopes with m	usses of 36,				
10		38 and 40 t	he mass abui	ndant isotope mu	ist be 36 as t	he average is c	losest to 36.				
2018	2	The two l	ines on the	e graph repre	sent the tw	vo different	isotopes				
6a (i)	2	of boron	with mass	numbers of 10) and 11.						
2018			(10)x20) + (11x8()) 20	0+880					
6a (ii)	10.8	r	ram =	100	<u> </u>	$\frac{100}{100} = 10$	0.8				
2018	14 🗖	Atomic n	umber = nu	mber of prot	ons = 6						
6h	$\int_{6}^{1} C$	Mass number = no. of protons + no. of neutrons = 6+8 = 14									

Na	Nat5 Past Paper Question Bank JARchem															
Traffic	: Lights	Uni	t 1.a	2a P	erioc	dic T	able	& A	tom	ic S [.]	truct	ture			-ne	
Outcome	<u>Int2</u>	<u>Int2</u>	<u>Int2</u>	<u>Int2</u>	<u>Int2</u>	<u>Int2</u>	<u>Int2</u>	<u>Int2</u>	<u>Int2</u>	<u>Int2</u>	<u>Int2</u>	<u>Int2</u>	<u>Int2</u>	<u>Int2</u>	<u>Int2</u>	<u>Int2</u>
ourcome	<u>2000</u>	<u>2001</u>	2002	<u>2003</u>	<u>2004</u>	<u>2005</u>	<u>2006</u>	2007	<u>2008</u>	<u>2009</u>	<u>2010</u>	<u>2011</u>	<u>2012</u>	<u>2013</u>	<u>2014</u>	<u>2015</u>
67			mc1						mc3							mc1
8	L3a							mc1						L1a(ii)		mc2
9		mc2				mc4				L1b(i)			mc4			
10										L1b(ii)	L1a					
11								1.1a				mc4		mc5		
														L4a		
12				mc3		mc5		L1b(i)	mc4		L1b(ii)					mc7
13							mc3				mc9					
10							mee				L1b(i)					
14	mc2	L1b		mc5			mc5	mc4	L1b(ii)	mc4			L1c(ii)		L2b(ii)	L1b
15-		11-			mc5	1.16			1.16.00	1.1.			11.00		1.21.0	11.
15a	mc1	LIa	mc3	mc24	L1a(i)	LID			LID(i)	LIa		mco	LIC(i)		L2D(i)	LIa
451					2-3(1)		mc7						-			
150			mc6				L3c	L13a(i)	mc6		L9d		mc5	Lila		
16	L3b				L1b									L4b		
Marking Scheme	Not Published	Not Published	Not Published	SQA Int2 2003 MSch	SQA Int2 2004 MSch	SQA Int2 2005 MSch	SQA Int2 2006 MSch	SQA Int2 2007 MSch	SQA Int2 2008 MSch	SQA Int2 2009 MSch	SQA Int2 2010 MSch	SQA Int2 2011 MSch	SQA Int2 2012 MSch	SQA Int2 2013 MSch	SQA Int2 2014 MSch	SQA Int2 2015 MSch

Int2	Answer	% Correct	Reasoning
2000 1	A	67	No. of protons = atomic number = 23 No. of neutrons = mass number - atomic number = 51-23 = 28 No. of electrons = atomic number - charge = 23 - 0 = 23
2000 2	D	55	Isotopes Same atomic number but different mass number Same number of protons but different number of neutrons
2001 2	A	90	☑A Sodium is in group 1 and has an electron arrangement of 2,8,1 ☑B Phosphorus is in group 5 has an electron arrangement of 2,8,5 ☑C Chlorine is in group 7 has an electron arrangement of 2,8,7 ☑D Argon is in group 0 has an electron arrangement of 2,8,8
2002 1	A	87	ElementAluminiumHydrogenIodineMagnesiumDate of Discovery1825176618111808
2002 3	В	77	Number of neutrons = mass number - atomic number = 35-17 = 18
2002 6	D	67	 ☑A Chlorine atoms have 17 electrons ∴ Chloride Cl⁻ ions have 18 electrons ☑B Sulphur atoms have 16 electrons ∴ Sulphide S²⁻ ions have 18 electrons ☑C Argon atoms have 18 electrons ☑D Sodium atoms have 11 electrons ∴ Sodium Na⁺ ions have 10 electrons
2003 3	В	71	Atoms are neutral when: total positive charge = total negative charge ∴ In neutral atoms: number of protons = number of electrons

²⁰⁰³ 5	С	75	IsotopesSame atomic numberbut different mass numberSame number of protons but different number of neutrons
²⁰⁰³ 24	A	81	Atomic number = number of protons = 26 Mass number = number of protons + number of neutrons = 26+30 = 56
²⁰⁰⁴ 5	A	66	In neutral atoms: number of protons = number of electrons Number of protons = atomic number = 26 = number of electrons
2005 4	В	89	 ☑A Halogens (group 7) have 7 electrons in their outer shell ☑B Noble gases have a full outer electron shell ∴2,8,8 is a Noble Gas (Argon) ☑C Alkali metals (group 1) have 1 electron in their outer shell ☑D Transition Metals (block between groups 2+3) do not have a full outer shell
²⁰⁰⁵ 5	D	58	Atoms of the same element must have the same atomic number and same number of protons. Isotopes of the same element have the same number of protons but can have different numbers of neutrons (hence a different mass number)
2006 3	С	80	Mass number \rightarrow 23 Atomic number \rightarrow 11 Mass number = no of protons + neutrons Atomic number \rightarrow 11 Atomic number = no of protons
²⁰⁰⁶ 5	В	82	IsotopesSame atomic numberbut different mass numberSame number of protons but different number of neutrons
2006 7	D	66	 ☑A Chlorine atoms have electron arrangement 2,8,7 ∴ Cl⁻ is 2,8,8 ☑B Sulphur atoms have electron arrangement 2,8,6 ∴ S²⁻ is 2,8,8 ☑C Argon atoms have electron arrangement 2,8,8 ☑D Sodium atoms have electron arrangement 2,8,1 ∴ Na⁺ is 2,8
2007 1	В	92	図A Fluorine is in group 7 and is in a different group from Argon (group 0) 図B Krypton and argon are both in Group 0 and have similar chemical properties 図C Potassium is in group 1 and is in a different group from Argon (group 0) 図D Zinc is a transition metal and is in a different group from Argon (group 0)
2007 4	D	65	 ☑A Isotopes have different nuclei as they have different numbers of neutrons ☑B Isotopes have different mass numbers due to different numbers of neutrons ☑C Isotopes have different numbers of neutrons ☑D Isotopes have same number of protons but different numbers of neutrons
2008 3	С	95	 ☑A ammonia is a compound with the formula NH₃ ☑B carbon dioxide is a compound with the formula CO₂ ☑C fluorine is a diatomic element with the formula F₂ ☑D methane is a compound with the formula CH₄
2008 4	D	81	 ☑A number of electrons = no of protons in neutral atoms ☑B number of neutrons = mass number - atomic number ☑C number of protons = number of electrons in a neutral atom ☑D number of protons = number of electrons in a neutral atom
2008 6	A	76	Charge on ion = number of protons - number of electrons = 19-18 = +1
2009 4	В	89	 A Isotopes have same number of protons but W=17 protons and X=11 protons B Isotopes have same number of protons but different number of neutrons C Isotopes have same number of protons but X=11 protons and Y=17 protons D Isotopes have same number of protons but Y=17 protons and Z=18 protons

2010			🗷 A mass = (1×12	2) + (2x16)	= 12+32 = 44amu						
2010	C	04	⊠B mass = (1×14	4) + (2x18) :	= 14+36 = 50amu						
9	C	00	☑C mass = (1×12	2) + (1x16) +	· (1×18) = 12+16+18	8 = 46amu	I				
-			⊠D mass = (1×14	4) + (1×16) +	+ (1×18) = 14+16+1	8 = 48amı	1				
2011				Particle	Location	Charge	Mass				
2011		72		Proton	in nucleus	+1	1 amu				
4	U	12		Neutron	in nucleus	0	1 amu				
				Electron	outside nucleus	-1	approx zero				
2011	•		Atomic number :	- number of	f protons - 26						
5	Α	88	Atomic number - number of protons = 20 Mass number - number of protons + number of neutrons = 26 + 30 = 56								
5	•••		Muss number - r		n orons + number		13 - 20 + 30 -	50			
2012			🗷 A lithium has d	a mass num	ber of 7 and oxyg	jen has a r	nass number o	f 16			
2012		O1 IBB lithium has an atomic number of 3 and oxygen has a atomic r		a atomic numb	er of 8						
4	D	01	⊠C lithium has 1	ium has 1 outer electron (group 1) and oxygen has 6 outer	s 6 outer elect	rons (group 6)					
			죄D Lithium (2,1) and oxygen (2,6) both have 2 occupied energy levels (electron shells)								
0010			⊠A Fluorine for	ms negative	e ions as it is a no	n-metal.					
2012	^	4∩	$f f B$ lithium atoms (2,1) forms lithium Li $^{+}$ ions with electron arrangement of 2								
5	C	40	☑C sodium atom	ns (2,8,1) fo	rms sodium Na⁺ ia	ons with e	lectron arrang	ement of 2,8			
5			🗷 D Neon is a No	oble Gas (gi	roup 0) and alread	ly has an e	electron arrang	gement of 2,8			
2012			🗷 D Neon is a No	oble Gas (gi Particle	roup 0) and alread	ly has an e Charge	electron arrang Mass	gement of 2,8]			
2013	6	02	ED Neon is a No	oble Gas (gi Particle Proton	roup 0) and alread Location in nucleus	dy has an e Charge +1	electron arrang Mass 1 amu	gement of 2,8			
2013 5	С	92	⊠D Neon is a No	oble Gas (gi Particle Proton Neutron	roup 0) and alread Location in nucleus in nucleus	dy has an e Charge +1 0	electron arrang Mass 1 amu 1 amu	gement of 2,8			
2013 5	С	92	⊠D Neon is a No	oble Gas (gi Particle Proton Neutron Electron	roup 0) and alread Location in nucleus in nucleus outside nucleus	y has an e Charge +1 0 -1	electron arrang Mass 1 amu 1 amu approx zero	gement of 2,8			
2013 5	С	92	⊠D Neon is a No ⊠A water is a co	oble Gas (gi Particle Proton Neutron Electron ompound of	roup 0) and alread Location in nucleus in nucleus outside nucleus hydrogen and ox	dy has an e Charge +1 0 -1 ygen with	electron arrang Mass 1 amu 1 amu approx zero formula H ₂ O	gement of 2,8			
2013 5 2015	C	92	≥D Neon is a Na ≥A water is a ca ≥B methane is a	oble Gas (gi Particle Proton Neutron Electron ompound of a compound	roup 0) and alread Location in nucleus in nucleus outside nucleus hydrogen and ox of carbon and hy	dy has an e Charge +1 0 -1 ygen with drogen wit	electron arrang Mass 1 amu 1 amu approx zero formula H ₂ O th formula CH.	gement of 2,8			
2013 5 2015 1	C C	92 94	 ☑D Neon is a Na ☑A water is a ca ☑B methane is a ☑C fluorine is a 	oble Gas (gi Particle Proton Neutron Electron ompound of a compound diatomic el	roup 0) and alread Location in nucleus in nucleus outside nucleus hydrogen and ox of carbon and hy lement with formu	dy has an e Charge +1 0 -1 ygen with drogen with ula F ₂	electron arrang Mass 1 amu 1 amu approx zero formula H ₂ O th formula CH.	gement of 2,8			
2013 5 2015 1	C C	92 94	 ☑D Neon is a Na ☑A water is a ca ☑B methane is a ☑C fluorine is a ☑D ammonia is a 	oble Gas (gi Particle Proton Neutron Electron ompound of a compound diatomic el a compound	roup 0) and alread Location in nucleus in nucleus outside nucleus hydrogen and ox of carbon and hy lement with formu of nitrogen and h	dy has an e Charge +1 0 -1 ygen with drogen wi ula F ₂ nydrogen v	electron arrang Mass 1 amu 1 amu approx zero formula H ₂ O th formula CH with formula N	gement of 2,8			
2013 5 2015 1	C C	92 94	 ☑ D Neon is a Na ☑ A water is a ca ☑ B methane is a ☑ C fluorine is a ☑ D ammonia is a ☑ A zinc is a tra 	oble Gas (gi Particle Proton Neutron Electron ompound of a compound diatomic el a compound nsition met	roup 0) and alread Location in nucleus in nucleus outside nucleus hydrogen and ox of carbon and hy lement with formu- of nitrogen and h al ∴ different ch	dy has an e Charge +1 0 -1 ygen with drogen with ula F ₂ nydrogen w emical pro	electron arrang Mass 1 amu 1 amu approx zero formula H ₂ O th formula CH with formula N operties to gro	gement of 2,8			
2013 5 2015 1 2015	C C	92 94	 ☑ D Neon is a Na ☑ A water is a ca ☑ B methane is a ☑ C fluorine is a ☑ D ammonia is a ☑ A zinc is a tra ☑ B potassium is 	oble Gas (gi Particle Proton Neutron Electron ompound of a compound diatomic el a compound nsition met s in group 1	roup 0) and alread Location in nucleus in nucleus outside nucleus hydrogen and ox of carbon and hy lement with formu of nitrogen and k al ∴ different chen	dy has an e Charge +1 0 -1 ygen with drogen wi ula F ₂ nydrogen v emical prope	electron arrang Mass 1 amu 1 amu approx zero formula H ₂ O th formula CH. with formula N operties to group	gement of 2,8			
2013 5 2015 1 2015 2015 2015	C C C	92 94 93	 ☑ D Neon is a Na ☑ A water is a ca ☑ B methane is a ☑ C fluorine is a ☑ D ammonia is a ☑ A zinc is a tra ☑ B potassium is ☑ C krypton and 	oble Gas (gi Particle Proton Neutron Electron ompound of a compound diatomic el a compound nsition met in group 1 argon have	roup 0) and alread Location in nucleus in nucleus outside nucleus hydrogen and ox of carbon and hy lement with form of nitrogen and h al ∴ different chen same chemical pr	dy has an e Charge +1 0 -1 ygen with drogen with drogen with ula F ₂ hydrogen with emical properties	electron arrang Mass 1 amu 1 amu approx zero formula H ₂ O th formula CH with formula N operties to group as they are bo	gement of 2,8 H3 Oup O argon O argon th in group O			
2013 5 2015 1 2015 2015 2	С С С	92 94 93	 ☑ D Neon is a Na ☑ A water is a ca ☑ B methane is a ☑ C fluorine is a ☑ D ammonia is a ☑ A zinc is a tra ☑ B potassium is ☑ C krypton and ☑ D chlorine is in 	oble Gas (gi Particle Proton Neutron Electron ompound of a compound diatomic el a compound a compound nsition met a ngroup 1 argon have n group 7	roup 0) and alread Location in nucleus in nucleus outside nucleus hydrogen and ox of carbon and hy lement with form of nitrogen and k al ∴ different chem same chemical pr different chemi	dy has an e Charge +1 0 -1 ygen with drogen with d	electron arrang Mass 1 amu 1 amu approx zero formula H ₂ O th formula CH. with formula N operties to group as they are bo ties to group (gement of 2,8			
2013 5 2015 1 2015 2 2015 2	С С С	92 94 93	 ☑ D Neon is a Na ☑ A water is a ca ☑ B methane is a ☑ C fluorine is a ☑ D ammonia is a ☑ D ammonia is a ☑ A zinc is a tra ☑ B potassium is ☑ C krypton and ☑ D chlorine is in ☑ A the number 	oble Gas (gi Particle Proton Neutron Electron ompound of a compound diatomic el a compound diatomic el a compound nsition met in group 1 argon have n group 7	roup 0) and alread Location in nucleus in nucleus outside nucleus hydrogen and ox of carbon and hy lement with form of nitrogen and h al ∴ different chem same chemical pr different chemi + neutrons is the	dy has an e Charge +1 0 -1 ygen with drogen with drogen with drogen with ida F ₂ hydrogen with cal properties cal properties mass num	electron arrang Mass 1 amu 1 amu approx zero formula H ₂ O th formula H ₂ O th formula CH with formula N operties to group as they are bo ties to group (ber (not the a	gement of 2,8 H3 Oup O argon O argon th in group O D argon tomic number)			
2013 5 2015 1 2015 2 2015 2 2015	C C C	92 94 93	 ☑ D Neon is a Na ☑ A water is a ca ☑ B methane is a ☑ C fluorine is a ☑ D ammonia is a ☑ A zinc is a tra ☑ B potassium is ☑ C krypton and ☑ D chlorine is in ☑ A the number ☑ B the number 	oble Gas (gi Particle Proton Neutron Electron ompound of a compound diatomic el a compound diatomic el a compound sition met a rgon have n group 7 of protons of neutrons	roup 0) and alread Location in nucleus in nucleus outside nucleus i hydrogen and ox of carbon and hy lement with form of nitrogen and k al ∴ different chem same chemical pr different chemi + neutrons is the s is independent o	dy has an e Charge +1 0 -1 ygen with drogen with drogen with drogen with drogen with ida F2 nydrogen v emical proper mass num of the num	Anticipation Mass 1 amu 1 amu 1 amu approx zero formula H ₂ O th formula H ₂ O th formula CH. with formula N operties to group as they are bo ties to group (ber (not the a ber of protons	gement of 2,8 H ₃ Oup O argon O argon th in group O D argon tomic number) s and electrons			
2013 5 2015 1 2015 2 2015 2 2015 7	C C D	92 94 93 84	 ☑ D Neon is a Na ☑ A water is a ca ☑ B methane is a ☑ C fluorine is a ☑ D ammonia is a ☑ D anmonia is a ☑ D antonia is a tra ☑ B potassium is ☑ C krypton and ☑ D chlorine is in ☑ A the number ☑ B the number ☑ B the number ☑ C the number 	oble Gas (gi Particle Proton Neutron Electron ompound of a compound diatomic el a compound diatomic el a compound nsition met in group 1 argon have n group 7 of protons of neutrons	roup 0) and alread Location in nucleus in nucleus outside nucleus hydrogen and ox of carbon and hy lement with formu- of nitrogen and k al ∴ different chemi- same chemical pr different chemi- t neutrons is the s is independent of s is independent of t of sis independent of t of sis independent of t of sis independent of t of t of sis independent of t of sis independent of t of	dy has an e Charge +1 0 -1 ygen with drogen wi ula F ₂ hydrogen v emical proper foperties of cal proper mass num of the num of the num	Anticipal States of the second	gement of 2,8 H ₃ Oup O argon O argon th in group O O argon tomic number) s and electrons s and electrons			
2013 5 2015 1 2015 2 2015 2 2015 7	C C C D	92 94 93 84	 ☑ D Neon is a Na ☑ A water is a ca ☑ B methane is a ☑ C fluorine is a ☑ D ammonia is a ☑ D ammonia is a ☑ D and a since is a tra ☑ B potassium is ☑ C krypton and ☑ D chlorine is in ☑ A the number ☑ B the number ☑ C the number ☑ C the number ☑ D atoms are number 	oble Gas (gi Particle Proton Neutron Electron ompound of a compound diatomic el a compound diatomic el a compound sition met a compound nsition met a rgoup 7 of protons of neutrons of neutrons eutral as nu	roup 0) and alread Location in nucleus in nucleus outside nucleus indrogen and ox of carbon and hy lement with form of nitrogen and k al ∴ different chem same chemical pr different chemi + neutrons is the s is independent of umber of protons	dy has an e Charge +1 0 -1 ygen with drogen with drogen with drogen with drogen with indensity of the non- mass num of the num = number	electron arrang Mass 1 amu 1 amu approx zero formula H2O th formula H2O th formula CH. with formula CH. operties to group as they are bor thies to group (aber (not the alber of protons) aber of protons of electrons	gement of 2,8 4 H ₃ bup 0 argon 0 argon th in group 0 0 argon tomic number) s and electrons s and electrons			

Int2	Answer	Reasoning							
2000	In same group of	Elements in the same group of the periodic table have the same chemical properties							
За	periodic table	e.g. alkali metals (group 1) and noble gases (group 0)							
2000		The relative atomic mass is the average mass of all the different							
3b	Answer to include:	isotopes of strontium. Each isotope has a mass which is a whole number.							
2001	19	No. of protons = atomic number = 19							
1.	20	No. of neutrons = mass number - atomic number = 39-19 = 20							
10	19	No. of electrons = atomic number - charge = 19 - 0 = 19							
2001	Same no. of protons but	Same atomic number but different mass number							
1b	different no. of neutrons	Isotopes Same number of protons but different number of neutrons							

2004	⁸¹ D	'n	Mass number — 81 Dn								
1a (i)	35 D		Atomic number $\longrightarrow 35$ DI								
2004	Δ	6	No. of protons = atomic number = 35								
1a(ii)	г 	0	No. of electrons = atomic number - charge = 35 - 0 = 35								
2004	Equal perc	centage of	If relative atomic mass closer to 79 than 81 More 79 present than 81 If relative atomic mass closer to 79 than 81 Final amounts of 70 and 81								
1b	79 and 8	1 present	If relative atomic mass hair way between to 79 and 81 Equal amounts of 79 and 81 If relative atomic mass closer to 81 than 79 More 81 present than 79								
2005			Atomic number = no. of protons = 9								
1b	9 F	19 -1	Nomic Number = 9 clement is rivorine Nass number = no. of protons + no of neutrons = 9+10 = 19								
			Charge = no. of protons - no. of electrons = 9-10 = -1								
2006	2	6	Number of protons = atomic number = 26								
3c	3	0	Number of neutrons = mass - atomic number = 56 -26 = 30 Number of electrons = no of protons - charge = 26 - (+3) = 23								
2007	<u>_</u>	.5									
1b(i)	í	2	Atomic number = no. of protons = 2								
10(1)			Lithium atoms have an electron arrangement of 2.1 (p1 data booklet)								
2007	2 or	· 2.0	Lithium ions attain a full outer shell by losing 1 electron								
13a(i)		_/-	$\begin{array}{rcl} Li & \rightarrow & Li^* + e^- \\ 2,1 & \rightarrow & 2 \end{array}$								
2008	29	34	No of protons = atomic number (lower number)								
1b(i)	29	36	No of neutrons = mass number (upper no.) - atomic number (lower no.)								
2008	Teet		Same atomic number but different mass number								
1b(ii)	1501	opes	Same number of protons but different number of neutrons								
2009	1	1	No. of protons = atomic number = 11 = 11								
1a	1	3	No. of neutrons = mass number - atomic number = 24 - 11 = 13 No. of electrons = atomic number - change = 11 - 0 = 11								
		•									
		*									
2009	$\langle \rangle$	$\langle \rangle \rangle$	Sodium has an electron arrangement of 2,8,1 (p7 data booklet)								
1b(i)	≹ (●	●) ≹)	 Inner shell holds a maximum of 2 electrons next shell holds a maximum of 8 electrons 								
	$\langle \langle \rangle \rangle$	< / /	next shell has one electron (but can hold a maximum of 8)								
	*	*									
2009	Positive	nucleus	The positively charge nucleus is attracted to the negatively charges								
1b(ii)	attracts	electrons	electrons spinning around the nucleus.								
			electron shell								
			proton								
2010	Nuc	leus	electron								
1a			Θ $n + m$								
			nucleus								
			neutron								

2010	8	Mass number = no. of protons + no. of neutrons									
1b(i)	8	= 3 + 5 = 8									
2010	number of protons equals	Atoms are electrically neutral because the number of positive									
1b(ii)	number of electrons	protons equals the number of negative electrons.									
2010	2.0	Particle Magnesium atom Mg ²⁺ ion									
9d	2,0	Electron Arrangement 2,8,2 2,8									
2012		Mass $N^{\circ} \rightarrow 11$ Mass number = protons + neutrons = 5+6									
1c (i)	₅B	Atomic $N^{\circ} \rightarrow 5^{\circ}$ Atomic number = no of protons =5									
2013	Same group in	Elements in the same group of the periodic table have similar chemical									
1 a(ii)	Periodic Table	properties e.g. alkali metals in group 1, noble gases in group 0									
2013	1	Number of protons = atomic number = 1									
4a	2	Number of neutrons = mass no - atomic no. = 3 - 1 = 2									
2012	1	Number of electrons = atomic number - charge = 1 - 0 = 1									
2013	1	Relative atomic mass is the average mass of the isotopes in a sample.									
4D		IT r.a.m. = I them the majority of the sample must also have a mass of I									
2013	299	Ca Ca ²⁺ + 2e ⁻									
11a	2,0,0	2,8,8,2 2,8,8 Calcium atom Calcium ion									
2014	79	Number of protons = atomic number = 79									
2h(i)	79	Number of electrons = atomic number - charge = 79 - 0 = 79									
2D(I)	118	Number of neutrons = mass no - atomic no. = 197 - 79 = 118									
2014	Answer from:	Same atomic number mass number									
2b(ii)		number of protons number of neutrons									
2015	126	No of neutrons - more number - stomic number - $210 - 94 - 124$									
1a	120	100.01 mean ons - mass number - a romic number - 210 - 04 - 120									
2015	Anguan from:	atomic number mass number									
1b	Answer Trom:	number of protons number of neutrons									

Nat5 Past Paper Question Bank																
Traffic	: Lights	Uni	t 1.a	2a P	erioc	dic T	able	& A	tom	ic S [.]	truct	ture	J	A150	ne	M
Outcome	<u>2000</u> Credit	<u>2001</u> Credit	2002 Credit	2003	2004	<u>2005</u> Credit	<u>2006</u> Credit	<u>2007</u> Credit	2008	2009	<u>2010</u> Credit	<u>2011</u> Credit	<u>2012</u> Credit	<u>2013</u> Credit		
67																
8																
9				18a												
10																
11									15a							
12																
13																
14	10b			11a (i)			9a (i)			9b		11 b(i)				
15a	10a						9a(iii)		15b(i)	9a		11b(ii)		10a(i) 10a(ii)		
15b				11c		13b		10b								
16	10c			11a(ii)		13a(i) 13a(ii)	9a (ii)	10a		9c				10b		

2000C 10aAtom protons neutrons 285iNeutrons 14Particle ProtonLocation in nucleusCharge Mass 1Mass num10a295i1415305i14162000C 10bisotopesIsotopes2000C 10bisotopesIsotopes2000C 10b285iRelative (average) Atomic Mass (28.11) is closest to 28 so 28 Si mu be the most common isotope.2003C 11a(i)isotopesIsotopes2003C 2003C100Same atomic number Same number of protons but different mass number Same number of protons but different mass number Same number of protons but different mass number be the most common isotope.2003C 2003C100Isotopes2003C 2003C100Isotopes2003C 2003C1001002003C 2003C1001002003C 2003C1001002003C 2003C1001002003C 2003C1001002003C 2003C1001002003C 2003C1001002003C 2003C1001002003C 2003C1001002003C 2003C1001002003C 2003C1001002003C 2003C1001002003C 2003C1001002003C 2003C1001002003C 2003C1001002003C 2003C1001002003C 2003C1001002003C 2003C <th>$\begin{array}{c c} \hline & A \text{tom} \\ \hline & 2^8 \text{Si} \\ \hline & 2^9 \text{Si} \\ \hline & 30 \text{Si} \\ \end{array}$</th>	$\begin{array}{c c} \hline & A \text{tom} \\ \hline & 2^8 \text{Si} \\ \hline & 2^9 \text{Si} \\ \hline & 30 \text{Si} \\ \end{array}$
2000c 28 Si 14 14 14 14 14 14 16 10a 29 Si 14 15 Neutron in nucleus 0 1 amu 30Si 14 16 Neutron in nucleus 0 1 amu 2000C isotopes Isotopes Same atomic number but different mass number 2000C 10b Isotopes Same atomic number of protons but different number of neutrons 2000C 28 Si Relative (average) Atomic Mass (28.11) is closest to 28 so 28 Si mu be the most common isotope. 2003C 11a(i) isotopes Isotopes Same atomic number but different mass number 2003C 203C 130 Isotopes Same atomic number of protons but different number of neutrons 2003C 11a(i) 15 Isotopes Same atomic number of protons but different number of neutrons 2003C 100 100 1000 1000 10000 2003C 11a(i) 1000000 100000000 1000000000000000000000000000000000000	a ²⁸ Si ²⁹ Si ²⁹ Si
IOa 235i 14 15 30Si 14 16 Neutron in nucleus 0 1 amu 2000C 30Si 14 16 Electron outside nucleus -1 approx zero 2000C isotopes Isotopes Same atomic number but different mass number 2000C isotopes Relative (average) Atomic Mass (28.11) is closest to 28 so ²⁸ Si mu 2000C 28Si Relative (average) Atomic Mass (28.11) is closest to 28 so ²⁸ Si mu 2003C 11a(i) isotopes Isotopes 2003C 130 Isotopes Same atomic number but different mass number 2003C 10 isotopes Isotopes Same atomic number but different mass number 2003C 10 isotopes Isotopes Same number of protons but different number of neutrons 2003C 11a(i) 12003C Isotopes Same number of protons but different number of neutrons 2003C 11a(i) 13000000000000000000000000000000000000	a 2351
2000C 10 Image: Sign of the s	300:
10bisotopesIsotopesSame atomic numberbut different mass number2000C28SiRelative (average) Atomic Mass (28.11) is closest to 28 so 28Si mu be the most common isotope.2003CisotopesIsotopes2003CIsotopesSame atomic number2003Cbe the most common isotope.2003CIsotopes2003CSame number of protons but different mass number2003CIsotopes2003CSame number of protons but different number of neutrons	
2000C 28Si Relative (average) Atomic Mass (28.11) is closest to 28 so 28Si mu be the most common isotope. 2003C isotopes Isotopes 2003C Isotopes Same atomic number but different mass number Same number of protons but different number of neutrons 2003C Relative (average) Atomic Mass (28.11) is closest to 28 so 28Si mu	b
10c 28Si 2003C isotopes 11a(i) Isotopes Same atomic number of protons but different number of neutrons 2003C	00
2003C isotopes Isotopes Same atomic number but different mass number 11a(i) Same number of protons but different number of neutrons	с
11a(i) Isotopes Isotopes 2003C Same number of protons but different number of neutrons	BC
2003	(i)
	BC
11a(ii) More ³³ Cl isotope in sample as average 35.5 is closer to 35 than 3	(ii)
2003C Particle Number no. of protons = atomic number (bottom number)	3C Pa
11c no. of neutrons = mass number - atomic number electron 18 no. of electrons = number of protons - charge	C ne
2003C Magnesium atoms have an electron arrangement of 2.8.2	3C
18a 2,8,1 Mg ⁺ ions have lost one electron so have electron arrangement of 2,8,1	a
2005 <i>C</i>	ōC
13a(i) 2 °Li and 'Li isotopes present in sample	(i)
2005C	5C
13a(ii) 0.9 r.a.m. = 100 = 100 = 100 = 0.9	(ii)
2005C Particle Number no. of protons = atomic number (bottom number)	5C Par
12b proton 3 no. of neutrons = mass number - atomic number	pr nei
electron 2 no. of electrons = number of protons - charge	ele
2006C	5C
9a(i) Isotopes Isotopes Same number of protons but different number of neutrons	(i)
2006 <i>C</i>	5C
9a(ii) 1.1 is nearer 1 than 2 so more ¹ H present than ² H	ii)
Atom protons neutrons	Atom
2006C 1 H 1 0 no of protons = atomic number (bottom number)	
9a (iii) no. of neutrons = mass number - atomic number	
2007C Equal proportions of The relative (average) atomic mass is an average. Average of 107 and 10	7C Equa
10a each isotope $\frac{(107+109)}{2} = 108$ if isotope masses 107 and 109 are equal.	a e
Particle Number No of protons = atomic number = 47 (± mark)	
$2007C \qquad proton \qquad 47 \qquad No. of neutrons = mass number - atomic number = 107 - 47 = 60 (\frac{1}{2} mark)$	7C Par
10h neutron 60	nei
electron 26 electrons in neutral atom - no. of protons = atomic number = 4/	ele

20000			Particle	Location	Charge	Mass]			
20080	(i) 1		Proton	in nucleus	+1	1 amu				
15a	(ii) Electron or e		Neutron	in nucleus	0	1 amu	-			
			Electron	outside nucleus	-1	approx zero				
2008C	Particle Number proton 90	No of protons = atomic number = 90								
15b(i)	neutron 144	No of neutrons = mass no atomic no. = 234 - 90 = 144								
2009C	10 10	Number of Protons = atomic number (lower number)								
9a	10 11 10 12	Number of Neutrons = mass number - atomic number (top number) (lower number)								
2009C			Some stamic number but different mass number							
9b	Isotopes	Isotopes Same number of protons but different number of neutrons								
2009C		The average atomic mass = 10.2 from masses of 10,11 and 12. The most								
9c	20	common type of atom must be 10 as average 10.2 is closest to 10								
2011 <i>C</i>		Same atomic number but different mass number								
11b(i)	isotopes	Isotopes Same number of protons but different number of neutrons								
2011 <i>C</i>	8 10	Number of Protons = atomic number (lower number)								
11b(ii)	8 8	Number of Neutrons = mass number - atomic number (top number) (lower number)								
2013 <i>C</i>	63 👝		ma	ss number						
10a(i)	29 CU	atomic number								
2013 <i>C</i>										
10a(ii)	34	Number of neutrons = mass number - atomic number = 63 - 29 = 34								
2013 <i>C</i>		The relative	atomic mass	is the average rel	ative	63+65				
10b	64	of the masses of the different isotopes atomic = = 64 mass 2								

Na	115			Pas	st Pa	aper	Que	estic	on B	ank			-		rright	
Traffic	: Lights	Uni	t 1.2	2a P	erioc	dic T	able	& A	tom	ic S ¹	truct	ture	J	A190	ne	M
Outcome	2000 General	2001 General	2002 General	2003 General	2004 General	2005 General	2006 General	2007 General	2008 General	2009 General	2010 General	2011 General	2012 General	2013 General		
67																
8						10a(ii)										
9		8a					10b(i)									
10							10a						10a			
11																
12		8b								10a		9a				
13																
14																
15a																
15b																
16																

SG General	Answer	Reasoning							
2001 <i>G</i> 8a	9+	The 1 st shell can hold a maximum of 2 electrons The 2 nd shell can hold a maximum of 8 electrons.							
2001 <i>G</i> 8b	no. of protons equals no. of electrons	Atoms are neutral because they have an equal number of positive charges (protons) and number of negative of negative charges (electrons)							
2005 <i>G</i>	same chemical	All elements in the same group have the same chemical properties							
10a(ii)	properties (or same no. of outer electrons)	and the same number of outer electrons							
2006 <i>G</i>		nucleus is positively charged because it contains positive protons							
10a	nucieus	and neutral neutrons							
2006 <i>G</i> 10b(i)		Electrons will form 4 pairs of electron in outer shell of neon to give electron arrangement 2,8							
2009 <i>G</i>	12 Metal	Atomic Number: number of protons in an atom							
10a	17 Non-metal	Metals are found on the left hand side of STEPS on Periodic Table							
2011G	Number of positive	Atoms are neutral because:							
9a	of negative charges	Number of protons = number of electrons (Positive charges) (Negative charges)							
2012G	Nucleur	The nucleus at the centre of an atom is positively charged and contains							
10a	INUCIEUS	protons and neutrons							