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SMART EXAM RESOURCES
9701 CAMBRIDGE AS CHEMISTRY
TOPIC QUESTIONS AND MARK SCHEMES
TOPIC :ATOMIC STRUCTURE
SUB-TOPIC: SUB-ATOMIC PARTICLES
SET-1-QP-MS

1 Isotopes of polonium, proton number 84, are produced by the radioactive decay of several elements including thorium, Th, proton number 90.

The isotope ^{213}Po is produced from the thorium isotope ^{232}Th .

Complete the table below to show the atomic structures of the isotopes ^{213}Po and ^{232}Th .

isotope	number of		
	protons	neutrons	electrons
^{213}Po			
^{232}Th			

[3]

	number of		
isotopes	protons	neutrons	electrons
^{213}Po	84	129	84
^{232}Th	90	142	90

allow **one mark** for each correct column

if there are no 'column' marks,

allow **maximum one mark** for a correct row

(3 × 1) [3]

2 (a) Fill the gaps in the table for each of the given particles.

name of isotope	type of particle	charge	symbol	electron configuration
carbon-13				$1s^2 2s^2 2p^2$
		-1	${}^{37}_{17}\text{Cl}^-$	
sulfur-34	atom	0		
iron-54	cation			$1s^2 2s^2 2p^6 3s^2 3p^6 3d^6$

[5]

(a)	name of isotope	type of particle	charge	symbol	electron configuration	[5]
	carbon-13	atom	0	${}^{13}_6\text{C}$	$1s^2 2s^2 2p^2$	
	chloride(-37)	anion	1-	Cl	$1s^2 2s^2 2p^6 3s^2 3p^6$	
	sulfur-34	atom	0	${}^{34}_{16}\text{S}$	$1s^2 2s^2 2p^6 3s^2 3p^4$	
	iron-54	cation	2+	${}^{54}_{26}\text{Fe}^{(2+)}$	$1s^2 2s^2 2p^6 3s^2 3p^6 3d^6$	

3 (a) A sample contains three different types of atom: ${}^{40}_{18}\text{Ar}$, ${}^{40}_{19}\text{K}$ and ${}^{40}_{20}\text{Ca}$.

- (i) State fully, in terms of the numbers of subatomic particles, what these three atoms have in common.

.....
..... [1]

- (ii) State fully, in terms of the numbers of **all** subatomic particles, how these three atoms **differ** from each other.

.....
..... [1]

MARK SCHEME:

(a)(i)	All have the same nucleon number OR same sum / total number of protons + neutrons	1
(a)(ii)	(different) number of protons, neutrons and electrons	1

4

Complete the table which describes a gaseous atom of gallium.

isotope	nucleon number	total number of electrons in lowest energy level	type of orbital which contains the electron in the highest energy level
^{71}Ga			

[3]

MARK SCHEME:

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isotope	nucleon number	total number of electrons in lowest energy level	type of orbital contains the electron in the highest energy level	3
⁷¹ Ga	M1 71	M2 2	M3 p (-orbital)	