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CAIE A LEVEL Chemistry Topic Questions / 9701

1.1.3-Calculations-of-Sub-Atomic-Particles-Set-2-qp

Total Questions: 11

Note:

- For questions with answer choices as statements 1, 2 and 3, follow these instructions for selecting options A/B/C/D:
- A= 1, 2 and 3 are correct
- B=1 and 2 only are correct
- C=2 and 3 only are correct
- D=1 only is correct

Questions

Question 1:

Skin cancer can be treated using a radioactive isotope of phosphorus, $^{32}_{15}\text{P}$. A compound containing the phosphide ion $^{32}_{15}\text{P}^{3-}$, wrapped in a plastic sheet, is strapped to the affected area.

What is the composition of the phosphide ion, $^{32}_{15}\text{P}^{3-}$?

	protons	neutrons	electrons
A	15	17	18
B	15	17	32
C	17	15	17
D	32	17	15

Question 2:

Which ion has more electrons than protons and more protons than neutrons?

[$\text{H} = {}^1_1\text{H}$; $\text{D} = {}^2_1\text{H}$; $\text{O} = {}^{16}_8\text{O}$]

- A D^- B H_3O^+ C OD^- D OH^-

Question 3:

In which species are the numbers of protons, neutrons and electrons all different?

- A ${}^{11}_5\text{B}$ B ${}^{19}_9\text{F}^-$ C ${}^{23}_{11}\text{Na}^+$ D ${}^{24}_{12}\text{Mg}^{2+}$

Questions (Continued)

Question 4:

Use of the Data Booklet is relevant to this question.

The ^{68}Ge isotope is medically useful because it undergoes a natural radioactive process to give a gallium isotope, ^{68}Ga , which can be used to detect tumours. This transformation of ^{68}Ge occurs when an electron enters the nucleus, changing a proton into a neutron.

Which statement about the composition of an atom of the ^{68}Ga isotope is correct?

- A It has 4 electrons in its outer p subshell.
- B It has 13 electrons in its outer shell.
- C It has 37 neutrons.
- D Its proton number is 32.

Question 5:

Use of the Data Booklet is relevant to this question.

The isotope ^{99}Tc is radioactive and has been found in lobsters and seaweed adjacent to nuclear fuel reprocessing plants.

Which statements are correct about an atom of ^{99}Tc ?

- 1 It has 13 more neutrons than protons.
- 2 It has 43 protons.
- 3 It has 99 nucleons.

Question 6:

The phosphide ion $^{31}_{15}\text{P}^{3-}$ and sulfide ion $^{32}_{16}\text{S}^{2-}$ have the same number of which sub-atomic particles?

- 1 neutrons
- 2 electrons
- 3 protons

Question 7:

In which species are the numbers of protons, neutrons and electrons all different?

- A $^{27}_{13}\text{Al}$ B $^{35}_{17}\text{Cl}^{-}$ C $^{32}_{16}\text{S}^{2-}$ D $^{39}_{19}\text{K}^{+}$

Questions (Continued)

Question 8:

Which ion has more electrons than protons and more protons than neutrons?

[H = ${}^1_1\text{H}$; D = ${}^2_1\text{H}$; O = ${}^{16}_8\text{O}$]

- A D^- B H_3O^+ C OD^- D OH^-

Question 9:

Use of the Data Booklet is relevant to this question.

In which species are the numbers of protons, neutrons and electrons all different?

- A ${}^{19}_9\text{F}^-$ B ${}^{23}_{11}\text{Na}^+$ C ${}^{31}_{15}\text{P}$ D ${}^{32}_{16}\text{S}^{2-}$

Question 10:

Use of the Data Booklet is relevant to this question.

Which statements are correct when referring to the atoms ${}^{23}\text{Na}$ and ${}^{24}\text{Mg}$?

- 1 They have the same number of full electron orbitals.
- 2 They have the same number of neutrons.
- 3 They are both reducing agents.

Question 11:

Use of the Data Booklet is relevant to this question.

In which set do all species contain the same number of electrons?

- A Co^{2+} , Co^{3+} , Co^{4+}
B F^- , Br^- , Cl^-
C Na^+ , Mg^{2+} , Al^{3+}
D K_2SO_4 , K_2SeO_4 , K_2TeO_4