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CAIE A LEVEL Chemistry Topic Questions / 9701

1.1.3-Calculations-of-Sub-Atomic-Particles-Set-3-qp

Total Questions: 10

Note:

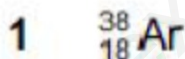
- For questions with answer choices as statements 1, 2 and 3, follow these instructions for selecting options A/B/C/D:
- A= 1, 2 and 3 are correct
- B=1 and 2 only are correct
- C=2 and 3 only are correct
- D=1 only is correct

Questions

Question 1:

X is a particle with 18 electrons and 20 neutrons.

What could be the symbol of X?



Question 2:

The ${}^1\text{H}_3^{+}$ ion was first characterised by J. J. Thomson over a century ago. ${}^6\text{Li}$ is a rare isotope of lithium which forms the ${}^6\text{Li}^{+}$ ion.

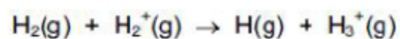
Which statements are correct?

- 1 Both ions contain the same number of protons.
- 2 Both ions contain the same number of electrons.
- 3 Both ions contain the same number of neutrons.

Question 3:

Use of the Data Booklet is relevant to this question.

The most common ion-molecule reaction in gas clouds of the Universe is as shown.



What could be the composition of an H_3^{+} ion?

	protons	neutrons	electrons
A	2	1	1
B	2	1	2
C	3	0	1
D	3	0	2

Questions (Continued)

Question 4:

In 2011 an international group of scientists agreed to add two new elements to the Periodic Table. Both elements had been made artificially and were called ununquadium (Uuq) and ununhexium (Uuh).

	Uuq	Uuh
proton number	114	116
nucleon number	289	292

Which statements about these elements are correct?

- 1 One atom of Uuh has one more neutron than one atom of Uuq.
- 2 One Uuq^{2-} ion has the same number of electrons as one atom of Uuh.
- 3 One Uuh^+ ion has the same number of electrons as one Uuq^- ion.

Question 5:

Use of the Data Booklet is relevant to this question.

In which option do all three particles have the same electronic configuration and the same number of neutrons?

- A $^{15}\text{N}^{3-}$ $^{16}\text{O}^{2-}$ $^{19}\text{F}^-$
B $^{18}\text{O}^{2-}$ $^{19}\text{F}^-$ ^{20}Ne
C $^{19}\text{F}^-$ ^{20}Ne $^{23}\text{Na}^+$
D ^{22}Ne ^{23}Na $^{24}\text{Mg}^{2+}$

Question 6:

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 $^{32}_{16}\text{S}^{2-}$

Questions (Continued)

Question 7:

The ion Y^{3-} contains 18 electrons and has a mass number of 31.

How many protons and neutrons does Y^{3-} contain?

	protons	neutrons
A	15	16
B	15	18
C	18	13
D	21	10

Question 8:

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 9:

In which pairs do both species have the same number of electrons?

- 1 ^{35}Cl and ^{37}Cl
- 2 $^{35}\text{Cl}^-$ and ^{40}Ar
- 3 ^{40}Ar and $^{40}\text{K}^+$

Questions (Continued)

Question 10:

Which statements about the atoms ^{23}Na and ^{24}Mg are correct?

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