2.1 Atomic & Electronic Structure

Question Paper

Course	DP IB Chemistry
Section	2. Atomic Structure
Topic	2.1 Atomic & Electronic Structure
Difficulty	Hard

Time allowed: 20

Score: /10

Percentage: /100

Question 1

Element X is in period 2 and has the first seven ionisation energies in kJ mol^{-1} as shown.

1300	3380	5330	7460	11 010	13 320	71 200

What is the electronic configuration of element X?

A $1s^2\ 2s^2\ 2p^4$

B $1s^2\ 2s^2\ 2p^2$

C $1s^2\ 2s^2\ 2p^3$

D $1s^2\ 2s^2\ 2p^6$

[1 mark]

Question 2

For the successive ionisation energies of oxygen, where would the highest jump be expected to occur?

A second ionisation energy

B first ionisation energy

C seventh ionisation energy

D sixth ionisation energy

[1 mark]

Question 3

Which statement explains the similarity in chemical behaviour for isotopes of the same element?

A they may have the same electronic configuration, depending on the reaction

B they have the same electronic configuration

C their mass numbers are different

D they have different numbers of neutrons

[1 mark]

Question 4

Which species produces a half-filled set of p orbitals on losing an electron?

A Li^+

B F

C N

D N^-

[1 mark]

Question 5

Which statement explains why electrons pair up in orbitals before occupying an orbital of a higher energy level?

A the energy from repulsion is greater than the jump to a higher orbital

B electrons occupy higher energy orbitals before lower energy orbitals

C electrons in lower orbitals have higher energies

D the energy from repulsion is less than the jump to a higher orbital

[1 mark]

Question 6

An element consists of two isotopes ^{69}X and ^{71}X, whose abundances are 60% and 40% respectively. What is the relative atomic mass of element X?

A 69.2

B 69.8

C 70.0

D 70.2

[1 mark]

Question 7

Which equation is correct for the third ionization energy for the element nitrogen?

A $N^{+}(g) \rightarrow N^{4+}(g) + 3e^{-}$

B $N^{2+}(g) \rightarrow N^{3+}(g) + e^{-}$

C $N(g) \rightarrow N^{3+}(g) + 3e^{-}$

D $N^{3+}(g) \rightarrow N^{4+}(g) + e^{-}$

[1 mark]

Question 8

A line emission spectrum occurs when

A electrons release energy as they move from high to low energy levels

B electrons release energy as they move from low to high energy levels

C electrons absorb energy as they move from high to low energy levels

D electrons absorb energy as they move from low to high energy levels

[1 mark]

Question 9

A spectral line that would be found in the **visible** spectrum of the hydrogen emission spectrum would be

A $n_1 \rightarrow n_2$

B $n_2 \rightarrow n_3$

C $n_3 \rightarrow n_2$

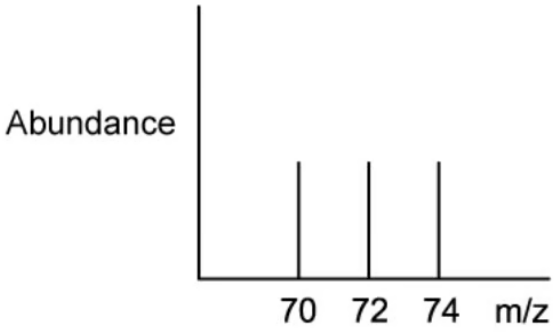
D $n_3 \rightarrow n_\infty$

[1 mark]

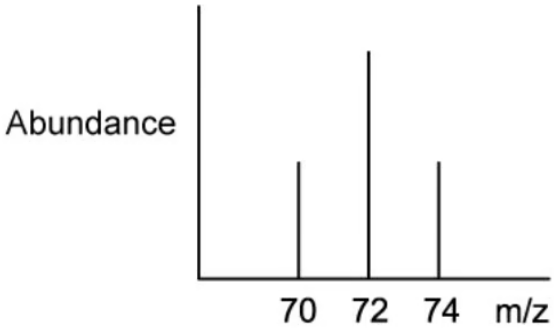
Question 10

Chlorine has two naturally occurring isotopes, ^{35}Cl and ^{37}Cl, whose abundance is 75% and 25% respectively. The mass spectrum of chlorine gas would be

A



B



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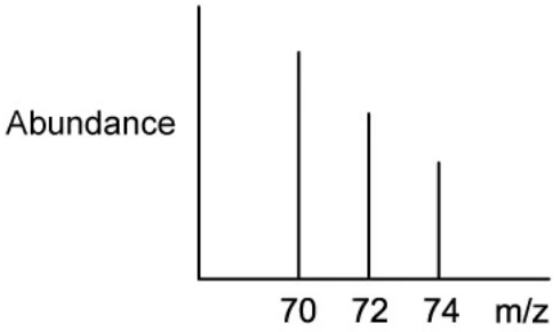

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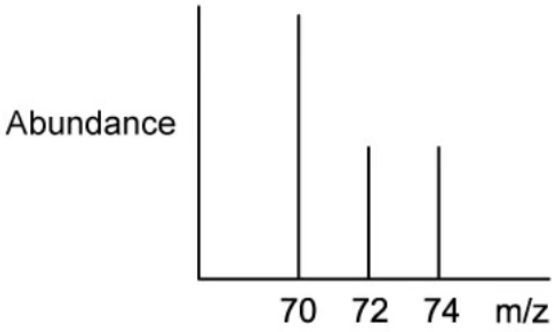

[1 mark]