

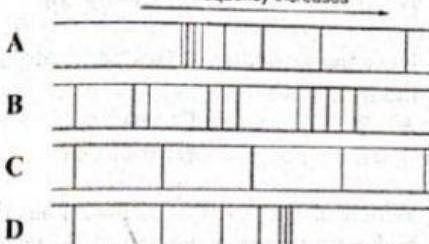
OBJECTIVE QUESTIONS

1 How many spectral lines can be formed in the line spectrum of the hydrogen atom for the first four energy levels?

A 4	C 6
B 5	D 7

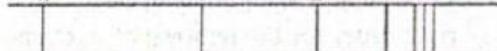
2 Which of the following best represents part of the hydrogen spectrum?

frequency increases



3 The diagram shows some spectral lines in the Balmer series of the atomic hydrogen spectrum.

X Y Z



How do the frequency and wavelength of the lines change from X to Z in this series?

	Frequency	Wavelength
A	Decreases	Increases
B	Increases	Decreases
C	Decreases	Decreases
D	Increases	Increases

4 Which electronic transition will produce the spectral line with the highest frequency in the hydrogen spectrum?

A $n = 3$ to $n = 1$
 B $n = 4$ to $n = 2$
 C $n = 5$ to $n = 3$
 D $n = 6$ to $n = 4$

5 The diagram below shows four lines in the Balmer series of the emission spectrum of hydrogen atom.



Which statement about the above spectrum is correct?

- A All the lines P , Q , R and S have distinct colours.
- B Line Q is formed when electrons move from energy level $n = 2$ to energy level $n = 1$.
- C Line R has a higher frequency than line Q .
- D Line S has the shortest wavelength.

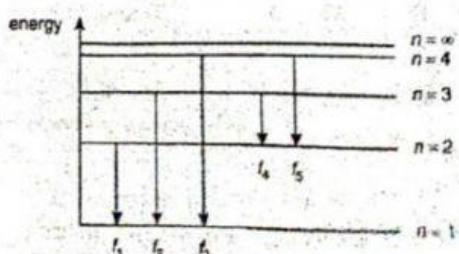
6 Some emission spectral lines in the Balmer series are shown in the diagram below.



Line X is caused by the electronic transition from

- A $n=2$ to $n=1$
- B $n=3$ to $n=1$
- C $n=3$ to $n=2$
- D $n=4$ to $n=2$

7 The energy level diagram for hydrogen atom below shows several electronic transitions with frequencies f_1, f_2, f_3, f_4 and f_5 .



Which of the following statements is true of the above diagram?

- f_1 represents the convergence limit of the Lyman series.
- f_1, f_2 and f_3 represent lines in the Lyman series.
- f_4 and f_5 are used to calculate the difference between the energy levels of $n = 4$ and $n = 5$.
- The frequency of f_1 is lower than that of f_4 .

8 One of the lines in the Lyman series has a wavelength of 102.7 nm. What is the energy of this electronic transition? [The Planck's constant, h , is 6.63×10^{-34} J s and the speed of light, c , is 3.00×10^8 m s $^{-1}$]

- 1.937×10^{-18} J
- 6.456×10^{-27} J
- 6.809×10^{-32} J
- 6.763×10^{-41} J

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9 An element Q has a valence electronic configuration of $3d^6 4s^2$. Which statement is true about Q ?

- The proton number of Q is 28.
- Atom Q has six valence electrons.
- Element Q is an *s*-block element.
- Q^{3+} ion is more stable than Q^{2+} ion.

10 Copper(I) sulphide is a component of chalcocite ore which is one of the sources of copper metal. In which orbitals are valence electrons of copper(I) ion and sulphide ion found? [Proton numbers of S and Cu are 16 and 29 respectively.]

Copper(I) ion		Sulphide ion	
A	$3d$		$3p$
B	$3d$		$3s$ and $3p$
C		$3p$	
D	$4s$ and $3d$		$3s$ and $3p$

STPM 2010/P1/Q4

11 The electronic configuration of X^{2+} ion is $1s^2 2s^2 2p^6 3s^2 3p^6 3d^3$. Which statement is true about element X ?

- Atom X has one valence electron.
- The proton number of element X is 21.
- An atom of X has four energy levels filled with electrons.
- The valence electronic configuration of atom X is $3d^1 4s^1$.

12 Which of the following is not a *d*-block element?

- $1s^2 2s^2 2p^6 3s^2 3p^6 3d^5 4s^1$
- $1s^2 2s^2 2p^6 3s^2 3p^6 3d^5 4s^2$
- $1s^2 2s^2 2p^6 3s^2 3p^6 3d^{10} 4s^2$
- $1s^2 2s^2 2p^6 3s^2 3p^6 3d^{10} 4s^2 4p^1$

13 How many electrons can be filled into the *d*-orbitals?

A	2	C	10
B	6	D	14

14 Which of the following species has the highest number of unpaired electrons?

A	Mg^{2+}	C	S
B	Al^{3+}	D	Cl^-

15 The proton number of an element X is 38. Which of the following shows the right order for the removal of electrons from their orbitals to form X^{3+} ion?

	First	Second	Third
A	$5s$	$5s$	$4p$
B	$5p_x$	$5p_y$	$5s$
C	$4p_z$	$4p_y$	$4p_z$
D	$4s$	$4p_z$	$3d$

16 Which orbital diagram shows the filling of electron(s) based on Hund's rule?

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17 An atom of element Z has nucleon number 55 and thirty fundamental uncharged particles in its nucleus. What is the electronic configuration of a Z^{2+} ion?

- $1s^2 2s^2 2p^6 3s^2 3p^6 3d^5$
- $1s^2 2s^2 2p^6 3s^2 3p^6 3d^4 4s^1$