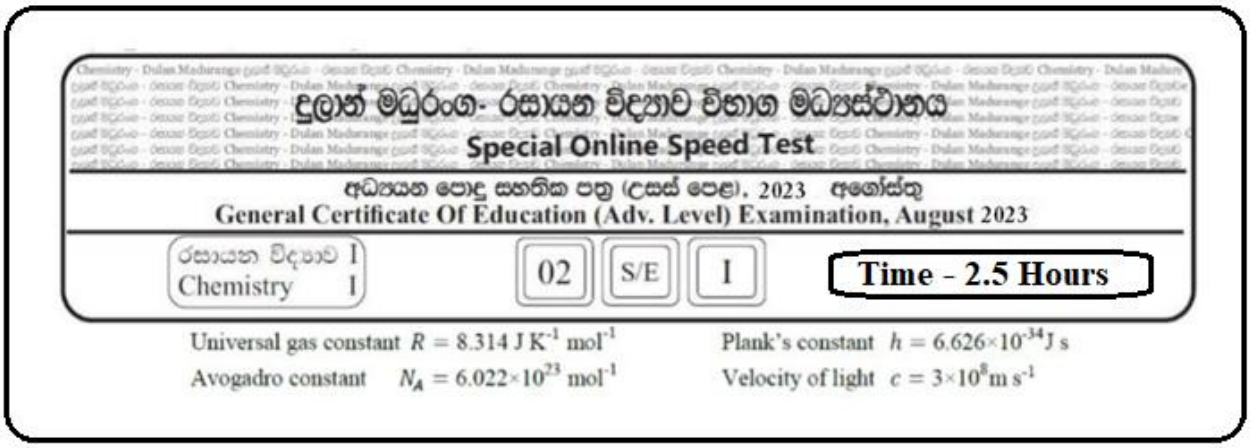


Monthly Evaluation Test – 2021 June

Part I- MCQ

❖ **Answer all the Questions.**

1. The scientist who showed that e/m ratio of cathode ray particle is not depend on the gas included in the cathode ray tube is,

(1) J.G. Stoney (2) Ernest Rutherford (3) J.J. Thomson
(4) R. Millikan (5) William Crookes

2. A German chemist has bombard neutrons on Uranium to get done a nuclear reaction. A new element X was formed having the atomic number 30. X can be ?

$$^{235}_{92}U + {}^{1}_{0}n \longrightarrow {}^{160}_{62}Sm + X + 4{}^{1}_{0}n$$

(1) Zn (2) Fe (3) Cu (4) Cd (5) Ca

3. Which of the following is not an electromagnetic radiation?

1) Micro waves 2) Rader waves 3) Laser rays 4) α rays 5) FM rays

4. In which of the following species has only one unpaired electron in the outermost energy level?

1) Na^+ 2) Cu^+ 3) Fe^{2+} 4) Cu^{2+} 5) Cr^{3+}

5. How many photons are required to give 100 J energy from a radiation with 400 nm wave length ?

(1) 2.10×10^{-18} (2) 2.01×10^{-18} (3) 4.97×10^{-19}
(4) 4.97×10^{-10} (5) 9.65×10^{-42}

6. Consider the electrons which are represented by the following quantum numbers

A ; n = 4, l = 1 , B ; n = 4 , l = 0 C ; n = 3 , l = 2 D ; n = 3 , l = 1

Which one is correct when these electros are arranged in the ascending order of their energies

1) D < B < C < A 2) B < D < A < C 3) A < C < B < D
4) C < A < D < B 5) D < C < A < B

7. When alpha particles are sent through a thin metal foil, most of them go straight through the foil because,

1) Alpha particles are much heavier than electrons.
2) Alpha particles are positively charged.
3) Most part of the atom is empty space.
4) Alpha particles move with high velocity.
5) Alpha particles have the highest penetrating power.

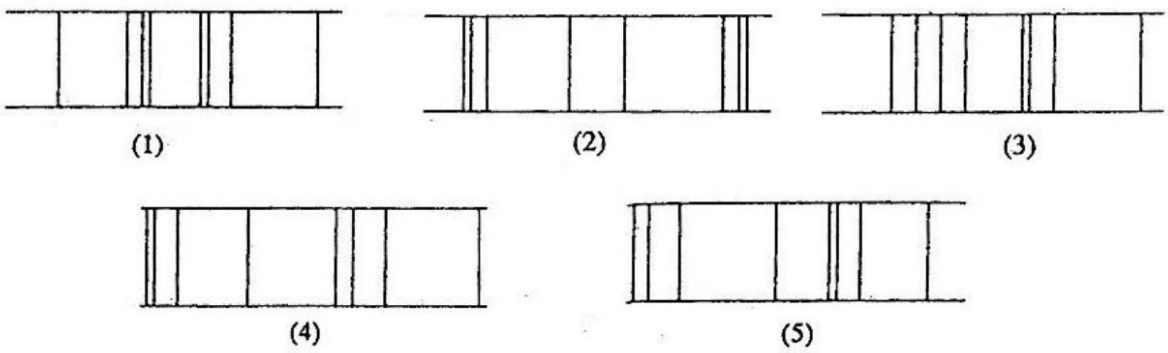
8. Which of the following is true regarding radiations α, β and γ which are emitted by radioactive elements / compounds?

(1) α ray is the radiation with the highest mass.
(2) β and γ rays deflect in electric field.
(3) Speeds of three radiations α, β and γ are equal to speed of light.
(4) γ rays do not penetrate even through concrete.
(5) γ rays have the highest ionization energy.

9. **Number of electrons that are in Cr^{3+} ion having one (1) as the azumuthal quantum number is,**

(1) 3 (2) 4 (3) 5 (4) 6 (5) 12

10. **Which of the following correctly represents the arrangement of the emission lines in two consecutive series in the atomic spectrum of hydrogen?**



(1) (2) (3) (4) (5)

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Special Online Speed Test

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General Certificate Of Education (Adv. Level) Examination, August 2023

රසායන විද්‍යාව I Chemistry I	02	S/E	I

Universal gas constant $R = 8.314\ J\ K^{-1}\ mol^{-1}$ Plank's constant $h = 6.626\times10^{-34}\ J\ s$

Avogadro constant $N_A = 6.022\times10^{23}\ mol^{-1}$ Velocity of light $c = 3\times10^{8}\ m\ s^{-1}$

Part II- A- Structured Essay

❖ **Answer all the questions**

1. (A) i) Identify the number of electrons corresponding to each of the set of quantum numbers given in I to IV and write the electronic configuration as $1s^2\ 2s^2$ ....

	Quantum number	Number of electrons	Complete electronic configuration ($1s^2$,$2s^2$....)
I	$n = 2, l = 1$		
II	$n = 3, l = 0, ml = 0$		
III	$n = 3, l = 1, ml = -1$		
IV	$n = 3, l = 0, ml = +1, \dot{m}_s = +\frac{1}{2}$		

ii) Identify the particles or the nuclides suitable for the blank cages hence balance the following nuclear Reaction equations.

(i) $^{14}_{7}N + \square \longrightarrow {}^{17}_{8}O + {}^{1}_{1}H$

(ii) $^{12}_{6}C + 2\square \longrightarrow {}^{14}_{7}N + {}^{0}_{-1}e$

(iii) $^{27}_{13}Al + {}^{4}_{2}He \longrightarrow \square + {}^{1}_{0}n$

(iv) $^{24}_{12}Mg + {}^{4}_{2}He \longrightarrow \square + {}^{1}_{0}n$

(v) $^{19}_{9}F + {}^{1}_{0}n \longrightarrow \square + {}^{0}_{-1}e$

(B) How many electrons are there in a phosphorus atom that should match with the given condition?

(I) When $l = 1$,

.....

.....

(i) $n = 2$ and $l = 0$,

.....

.....

Atomic number of Cr is 24.

(ii) Write down the electron configuration of Cr^{3+} ion,

.....

.....

(iii) In the Cr^{3+} ion,

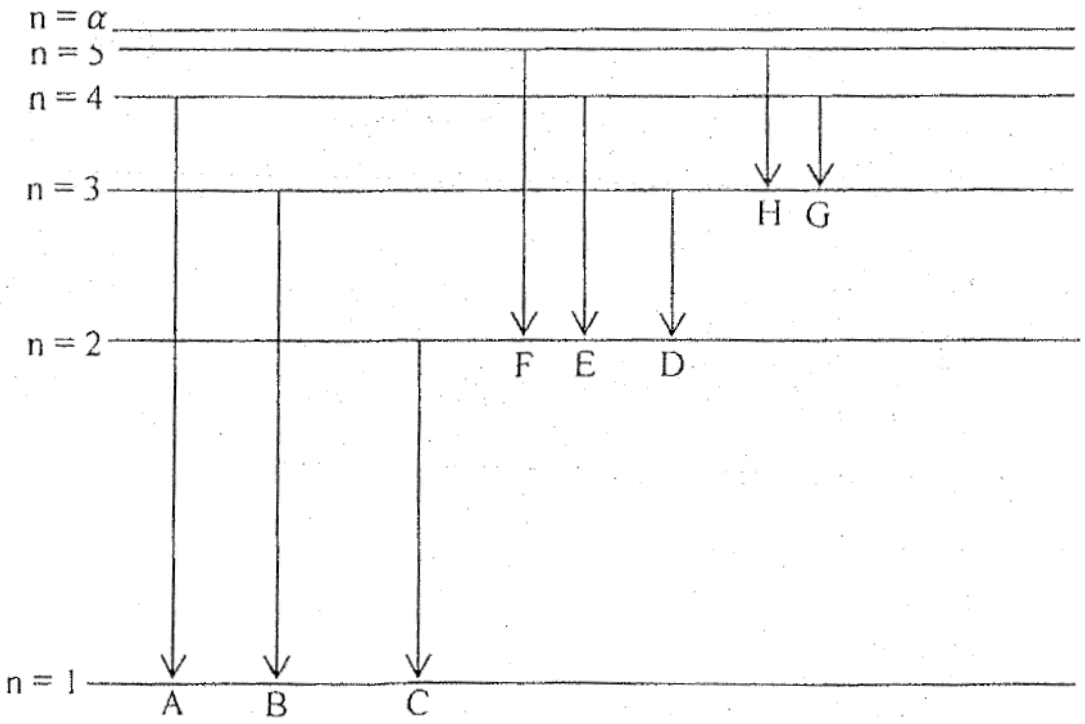
I. How many electrons as $m_s = +\frac{1}{2}$,

.....

II. How many electrons as $n + l = 4$ and $m_s = -\frac{1}{2}$?

.....

2. (A) Following is a diagram which shows transitions of electrons in between energy Levels of Hydrogen



(i) Draw the corresponding spectral lines for above 08 electronic transitions in emission spectrum in following diagram 2

Diagram 2

(ii) Label each line as A, B, C, D, E, F, G & H in diagram - 2 to show the corresponding electronic transitions.

(iii) Fill in the table.

	Name of the line series	Region corresponds to the electromagnetic spectrum
1. A B C		
2. D E F		
3. G H		

(iv) Draw the electronic transition relevant to 1st ionization of Hydrogen in diagram 1 using an arrow and label it as P.

(v) Calculate the frequency of the line which has the least frequency, if the energy of energy levels of 1,2,3,4 and 5 are –1312, –328, –146, –82 and –52.5 kJ mol^{-1} respectively.

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Special Online Speed Test

අධ්‍යයන පොදු සහතික පත්‍ර (උසස් පෙළ), 2023 අගෝස්තු

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රසායන විද්‍යාව I Chemistry I	02	S/E	I

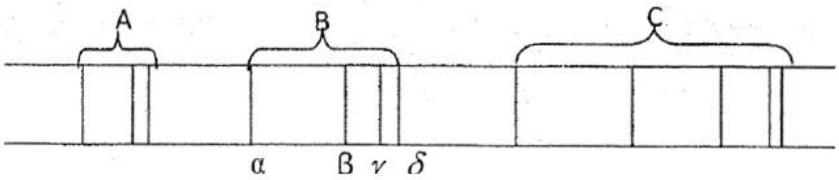
Universal gas constant $R = 8.314\ J\ K^{-1}\ mol^{-1}$ Plank's constant $h = 6.626\times10^{-34} J\ s$

Avogadro constant $N_A = 6.022\times10^{23}\ mol^{-1}$ Velocity of light $c = 3\times10^{8} m\ s^{-1}$

Part II- B Essay

Answer all the questions.

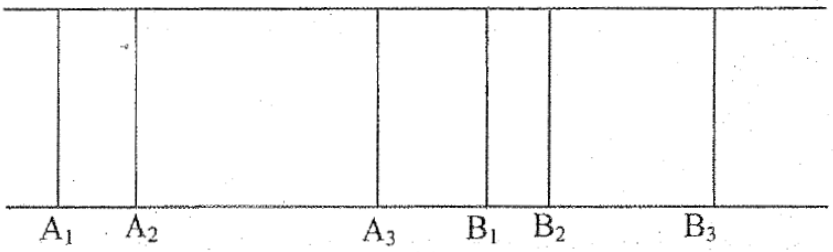
3. (A The successive spectral lines of atomic spectrum of hydrogen are given below.



Marks √ for correct statement and x for incorrect statement in the brackets regarding the following statements based on spectral lines of hydrogen atoms.

1) The series B appears in the visible region of electro magnetic spectrum. ( )
2) The last line of the series C has the longest wave length ( )
3) The energy difference between the adjacent lines decrease from series A to series C. ( )
4) Series A appear in the UV region of electromagnetic spectrum. ( )
5) The frequency increases uniformly from the series A series B. ( )
6) The energy transition of β line is from n=2 to n=4. ( )
7) the energy difference of β, α lines is equal to the energy differences {(n=4) - (n=3)}. ( )
8) The distance between the line of each series decreases in the direction of increases in energy. ( )

(B) Following diagram represents the first three lines in each of the two series of lines with highest frequency..



i) Identify above A and B series.

ii) Write electron transitions relevant for formation lines from A_1 to B_3.

iii) Heated objects emit energy in the form of radiation composed of energy packets known as quanta. If the frequency of the radiation is ν, energy of a quanta is E = hν.

I. Wavelength of a certain electromagnetic radiation is 420 nm. Calculate frequency of the radiation and energy of a photon.

II. Name the region in the electromagnetic spectrum to which this radiation belong.

III. State two uses of electromagnetic radiation which belong to the above region.

4..(A) The homogeneous mixture of inert substances contain 8.0 g of A, 18.0 g of B and 24.0 g of C only. (molar masses A = 4.0 g mol^{-1} B = 18.0 g mol^{-1}, C = 12. 0g mol^{-1})

i) Calculate the mass fractions of A, B and C.

ii) Calculate mole fractions of A, B and C.

iii) Calculate the mole percentages of A, B and C.

(B)

he bond energy of Cl_2 molecule is 240 kJ mol^{-1}. Certain electromagnetic radiation can break this bond forming chlorine free radicals. (chlorine atoms)

i) Calculate the minimum frequency of the electromagnetic radiation which is capable of breaking this bond.

ii) Calculate the wave length of this electromagnetic radiation, mentioned in part (i) above

iii) State the region of arrangement of the electromagnetic spectrum to which the above radiation belongs and write a use of the radiation of this region.

********** **Monthly Evaluation Test - June 2021** **********