

Half Yearly Examination - 2016-17

No. of Printed Page : 5  
 Subject : Chemistry  
 Time : 3 hrs.

Roll No. ...11033.....  
 Class : XI  
 Maximum Marks : 70

General Instructions-

- (i) All questions are compulsory.
- (ii) Question numbers 1 to 5 are very short answer questions and carry 1 mark each.
- (iii) Question numbers 6 to 10 are short-answer questions and carry 2 marks each.
- (iv) Question numbers 11 to 22 are also short-answer questions and carry 3 marks each.
- (v) Question number 23 is a value based questions and carries 4 marks.
- (vi) Question numbers 24 to 26 are long-answer questions and carry 5 marks each.
- (vii) Use log tables for calculations.

1. How many electrons are present in 16g of CH<sub>4</sub>? (1)
2. Why anions are larger in radii than their parent atoms? (1)
3. Write the Lewis dot structure of CH<sub>3</sub>COOH. (1)
4. What will be the order of energy levels 3s, 3p and 3d in case of H-atom? (1)
5. What will be the minimum pressure required to compress 500 dm<sup>3</sup> of air at 1 bar to 200 dm<sup>3</sup> at 30°C. (1)
6. (a) Why is 4s filled before 3d? (1)
- (b) What are the possible value of n & l for 3d orbitals? (2)
7. What is the total number of sigma and pi-bond in the following molecules. (2)
- (a) C<sub>2</sub>H<sub>2</sub> (1)
- (b) C<sub>2</sub>H<sub>4</sub> (1)
8. How many grams of Cl<sub>2</sub> are required to completely react with 0.4g of H<sub>2</sub> to yield HCl? (2)
9. Give reason for the following : (2)
- (a) Electron gain enthalpy of F is less negative than chlorine.
- (b) Ionisation enthalpy of nitrogen is more than that of oxygen.

P.T.O.

10. Which out of  $\text{NH}_3$  and  $\text{NF}_3$  has higher dipole moment and why? (2)

OR  
Explain why  $\text{BeH}_2$  molecule has a zero dipole moment although the Be-H bonds are polar. (2)

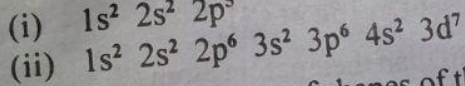
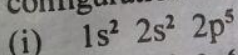
11. A gaseous mixture contains 2.2 bar He, 1.1 bar  $\text{H}_2$  and 4.2 bar  $\text{N}_2$ . What is mol fraction of  $\text{N}_2$ ? (3)

12. The density of 3M solution of NaCl is 1.25g/ml. Calculate the molality of the solution. (3)

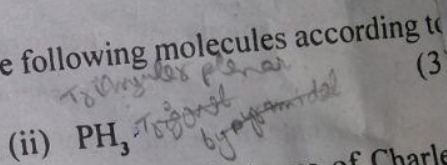
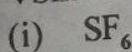
OR

A welding fuel gas contains carbon & hydrogen only. Burning a small sample of it in oxygen gives 3.38g carbon dioxide, 0.690g of water and no other products. A volume of 10.0L (measured at STP) of this welding gas is found to weigh 11.6g. Calculate (i) empirical formula (ii) molar mass of the gas (iii) molecular formula. (3)

13. (a) State Hund's maximum multiplicity rule. (3)  
(b) Draw orbitals diagram for atoms with the following electronic configuration.



14. Draw and write the name of shapes of the following molecules according to VSEPR. (3)



15. (a) Explain why  $-273^\circ\text{C}$  is the lowest temperature in terms of Charles' law? (3)

(b) Name and state the law governing the expression of gases when they are heated or cooled at constant pressure.

16. Emission transitions in the Paschen's series and at orbit  $n = 3$  and start from orbit  $n$  and can be represented as  $\nu = 3.29 \times 10^{15} \text{ (Hz)} \left( \frac{1}{3^2} - \frac{1}{n^2} \right)$ . Calculate the value of  $n$  if the transition is observed at 1285 nm. Find the region of spectrum. (3)

17. (a) Arrange the following elements in the increasing order of metallic character—  
Si, Be, Mg, Na, P

Na, Be, Mg, Si, P  
① ② ③ ④ ⑤  
66263  
19870

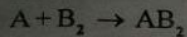
◇ 2 (XI) ◇

(2)

(b) Arrange the following ions in the order of increasing ionic radii—  
 $\text{Na}^+$ ,  $\text{Mg}^{2+}$ ,  $\text{F}^-$ ,  $\text{O}^{2-}$

(c) Why is electronegativity of elements increases on moving from left to right in a periodic table?

18. In a reaction—



(3)

Identify the limiting reagent, if any, in the following reaction mixtures.

(i) 300 atoms of A + 200 molecules of B.

(ii) 2 mol A + 3 mol B.

(iii) 100 atoms of A + 100 molecules of B.

(iv) 5 mol A + 2.5 mol B.

(v) 2.5 mol A + 5 mol B

19. (a) Write the resonance structure for :

(3)

(i)  $\text{SO}_3$

(ii)  $\text{NO}_2$

(b) Write the significance of a plus and a minus sign shown in representing the orbitals.

20. (a) Express the following in scientific notation.

(i) 0.0048

(ii) 500.0

(iii) 6.0012

(b) Find how many significant figures are present in the following :

(i)  $7.21 + 10.245 + 0.0548$

(ii)  $2 \times 2.364$

(iii) 520.28

21. (a) Draw the structure of  $\text{PCl}_5$  and mention its hybridisation.

(b) Draw the hybridised orbital diagram for  $\text{C}_2\text{H}_2$ .

22. (a) Using s, p, d notations, describe the orbital with the following quantum numbers :

(i)  $n = 1, \ell = 0$

(ii)  $n = 4, \ell = 4$

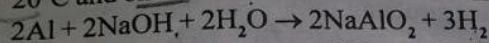
(b) Nitrogen laser produces a radiation at a wavelength of 337.1 nm. If the number of photons emitted is  $5.6 \times 10^{24}$ , calculate the power of this laser.

23. Chemical reactivity of elements is highest at the two extremes of a period and is lowest in the centre. Highly reactive elements do not occur in nature in free states, they usually occur in combined state. Some students are highly

aggressive and keep on fighting with each other like highly reactive elements. Some students are sober and help each other and do not fight.

- (i) Which group elements are most reactive?  
(ii) Which group elements are least reactive and why?  
(iii) What values are possessed by sober people?  
(iv) What kind of people pick up fight, while driving on the road in case of accidents? What are its consequences? What should we do?

24. (a) Calculate the temperature of 4 mole of a gas occupying  $5 \text{ dm}^3$  at  $3.32 \text{ bar}$  [ $R = 0.083 \text{ bar dm}^3 \text{ k}^{-1} \text{ mol}^{-1}$ ]  
(b) The drain cleaner, drainex contains small bits of aluminium which react with caustic soda to produce dihydrogen. What volume of dihydrogen at  $20^\circ\text{C}$  and one bar will be released when  $0.15 \text{ g}$  of aluminium reacts:



OR

- (a)  $2.9 \text{ g}$  of a gas at  $95^\circ\text{C}$  occupied the same volume as  $0.184 \text{ g}$  of hydrogen at  $17^\circ\text{C}$  at the same pressure. What is the molar mass of the gas? (3)  
(b) State Boyle's law. Give its possible graphs (at least two graphs) (2)
25. (a) Indicate the number of unpaired electron in: (1)

- (i) Fe (ii) Kr  
(iii) Si

(At. no. of Fe = 26, Si = 14, Kr = 36)

- (b) If the velocity of the electron in Bohr's orbit is  $2.19 \times 10^6 \text{ ms}^{-1}$ . Calculate the de Broglie wavelength associated with it. ( $h = 6.626 \times 10^{-34} \text{ J s}$ ) (2)

- (c) Write the electronic configuration of:

- (i)  $\text{CO}^{2+}$  (ii)  $\text{Ti}^+$

(Atomic number of C = 27, Ti = 22)

OR

- (a) How many electrons will be present in the sub-shells having  $m_s$  value of  $-\frac{1}{2}$  for  $n = 4$ ? (2)

- (b) Write the electronic configuration of:

- (i)  $\text{Fe}^{3+}$  (ii)  $\text{Mn}^{2+}$

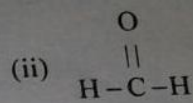
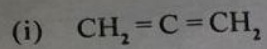
[Atomic number of Fe = 26, Mn = 25]

- (c) Give reason for the stability of half-filled and fully-filled orbital. (1)

- (d) State Aufbau rule. (1)

elements.

26. (a) Describe the hybrid state of each carbon in : (2)



n case of

(b) Write configuration of  $\text{N}_2^+$  and  $\text{N}_2^-$  according to molecular orbital theory. Compare their relative stabilities and magnetic properties.

OR

3-32 bar

(a) Write configuration of  $\text{O}_2^+$  and  $\text{O}_2^{2-}$  according to molecular orbital theory. Compare their relative stabilities and magnetic properties.

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(b) Sketch the bond moments and resultant dipole moments in cis and trans forms of  $\text{C}_2\text{H}_2\text{Cl}_2$ . (2)