

INTERNATIONAL INDIAN SCHOOL DAMMAM
FIRST TERMINAL EXAMINATION-2012

SET-A.

Class: XI.
Subject: CHEMISTRY

Time: 3 hrs.
Max. Marks: 70.

General Instructions.

1. All questions are compulsory.
2. Questions 1 to 8 are very short answer questions and carry one mark.
3. Questions 9 to 18 are short answer questions and carry two marks.
4. Questions 19 to 27 are short answer questions and carry three marks.
5. Questions 28, 29 & 30 are long answer questions and carry five marks.
6. Use log tables if necessary.
7. Calculate the amount of Carbon dioxide that could be produced when one mole of carbon is burnt in 16 g of dioxygen.
2. 1 M or 1m solution, which is more concentrated? Why?
3. What is photoelectric effect?
4. How many electrons in an atom may have the following quantum numbers?
 $n=4, m=0, l=0, m_l=0$
5. State modern periodic law.
6. Draw the Lewis dot structure of CO.
7. Write the general outer electronic configuration of f-Block elements.
8. Define lattice Enthalpy.
9. State and illustrate the law of multiple proportion.
10. (a) Boron has two isotopes, the relative abundance of ^{10}B is 20% and that of ^{11}B is 80%. Find the average atomic mass of Boron.
(b) How many significant figures are present in the following. (1) 0.0025 (2) 208
11. (a) write the mathematical expression of Heisenberg's uncertainty principle.
(b) State Pauli Exclusion principle.
12. Calculate the energy associated with the first orbit of He.
What is the radius of this orbit.

(1)

13. (a) Give any two properties of cathode rays.
(b) What are the limitations of Bohr's model for hydrogen atom.
14. Concentrated H_2SO_4 is 98% by weight and density 1.84 g/cc . What volume of conc. acid is required to make 5.0 L of 0.50 M. H_2SO_4 .
15. (a) On the basis of quantum numbers, justify that the sixth period of the periodic table should have 32 elements.
(b) write the electronic configuration of Cu (atomic number 29).
16. Discuss the shape of the following molecules using the VSEPR model.
(a) BCl_3 (b) AsF_3 (c) SF_6 (d) SF_4 .
17. Define electronegativity. How does it differ from electron gain enthalpy?
OR
Explain the formation of H_2 molecule on the basis of valence bond theory.
18. (a) What is meant by hybridisation of atomic orbitals?
(b) Which hybrid orbitals are used by carbon atoms in the following molecules?
(i) CH_3CHO (ii) CH_3COOH
19. How much magnesium sulphide can be obtained from 2.00 g of magnesium and 2.00 g of sulphur by the reaction $\text{Mg} + \text{S} \rightarrow \text{MgS}$. ? Which is the limiting reagent? Calculate the amount of one of the reactants which remains unreacted? ($\text{Mg} = 24 \text{ u}$, $\text{S} = 32 \text{ u}$)
20. An organic compound on analysis gave the following data: C = 57.82%, H=3.6% and the rest is Oxygen. Its molecular mass is 166. Find its empirical and-- molecular formula. ($\text{H}=1\text{u}$, $\text{C}=12\text{u}$, $\text{O}=16\text{u}$).
21. (a) State de Broglie relation.
(b) State Hund's rule of maximum multiplicity.
(c) Draw the shape of d_{z^2} orbital.
22. (a) Write IUPAC name and symbol of an element with atomic number 117.
(b) How would you explain the fact that the first ionization enthalpy of sodium is lower than that of magnesium but its second ionization enthalpy is higher than that of magnesium?
23. Describe the hybridisation in case of PCl_5 . Why are the axial bonds longer as compared to equatorial bonds?
24. (a) Which out of NH_3 **and** NF_3 has higher dipole moment and Why.?
(b) Give any two limitations of the octet rule.

25. (a) What are the frequency and wave length of a photon emitted during a transition from $n=5$ state to the $n=2$ state in the hydrogen atom?
($h=6.626 \times 10^{-34}$ Js)
(b) Write Rydberg equation for Balmer series.

OR

- (a) The threshold frequency ν_0 for a metal is $7.0 \times 10^{14} \text{ s}^{-1}$. Calculate the kinetic energy of an electron emitted when radiation of frequency $\nu = 1.0 \times 10^{15} \text{ s}^{-1}$ hits the metal.
(b) An electron is in one of the $3d$ orbitals. Give the possible values of n , l and m_l for this electron.

26. (a) Consider the following species:

N^{3-} , O^{2-} , F^- , Na^+ , Mg^{2+} and Al^{3+} .

- (i) What is common in them?
(ii) Arrange them in the order of increasing ionic radii.

(b) Would you expect the first ionization enthalpies for two isotopes of the same element to be the same or different? Justify your answer.

27. Compare the relative stabilities of the following species and indicate the magnetic properties of O_2 , O_2^+ , O_2^- . Draw the Molecular Orbital diagram of O_2 molecule.

28. (a) Yellow light emitted from a sodium lamp has a wave length of 580 nm. Calculate the frequency and wave number of the yellow light.

(b) Show that the circumference of the Bohr orbit for the hydrogen atom is an integral multiple of the de Broglie wavelength associated with the electron revolving around the orbit.

- (c) Explain why atoms in the half filled and completely filled orbitals have extra stability.
(d) What is Bohr's frequency rule?

OR

- (a) Calculate the wave length, frequency and wave number of a light whose period is $2.0 \times 10^{-10} \text{ s}$.
(b) Which has higher energy $5d$ or $6s$ orbital? Explain your answer.
(c) What is Planck's quantum theory?
(d) What is Bohr's radius? Give its value.

29. Give reason:

- (a) Electron gain enthalpy of sulphur is greater than oxygen.
(b) Ionization enthalpy of beryllium is greater than boron.
(c) Noble gases show positive electron gain enthalpy.
(d) Identify the position of the element with electronic configuration
(i) $ns^2 np^4$ ($n=3$) (ii) $(n-1)d^2 ns^2$ ($n=4$).

(3)

OR

(a) The first ionization enthalpy values (in kJ/mol) of group 13 elements are:

B	Al	Ca	In	Tl
801	577	579	558	589

How would you explain this deviation from the general trend?

(b) Which of the following will have the most negative electron gain enthalpy and which the least negative?

P, S, Cl, F. Explain your answer.

(c) Why do elements in the same group have similar physical and chemical properties?

30. (a) Write the resonance structures for carbonate ion. How resonance is related to stability of the molecules?

(b) Although both CO_2 and H_2O are triatomic molecules, the shape of H_2O molecule is bent while that of CO_2 is linear. Explain this on the basis of dipole moment.

(c) Define Hydrogen bond.

OR

(a) Apart from tetrahedral geometry, another possible geometry for CH_4 is square planar. Explain why CH_4 is not square planar?

(b) Although geometries of NH_3 and H_2O molecules are distorted tetrahedral, bond angle in water is less than that of ammonia. Discuss.

(c) Arrange the bonds in order of increasing ionic character in the molecules: LiF , K_2O , N_2 , SO_2 and PF_3 .

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(4)

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6. Use log tables if necessary.
7. Calculate the amount of Carbon dioxide that could be produced when one mole of carbon is burnt in 8 g of dioxygen.
2. 1 M or 1m solution, which is less concentrated? Why?
3. What is threshold frequency?
4. How many electrons in an atom may have the following quantum numbers?
(a) $n=3$, $m_s=-\frac{1}{2}$ (b) $n=4$, $l=0$.
5. State Mendeleev's periodic law.
6. Draw the Lewis dot structure of CO_2 .
7. Write the general outer electronic configuration of f-Block elements.
8. Define Bond Enthalpy.
9. Calculate the energy associated with the first orbit of He.
What is the radius of this orbit.
10. (a) Chlorine has two isotopes, the relative abundance of ^{35}Cl is 75.77% and that of ^{37}Cl is 24.23%. Find the average atomic mass of Chlorine.
(b) How many significant figures are present in the following
(1) 0.0035 (2) 408
11. (a) write the mathematical expression of Heisenberg's uncertainty principle.
(b) State Pauli Exclusion principle.
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(1)

13. (a) Give any two properties of canal rays.
(b) What are the limitations of Bohr's model for hydrogen atom.
14. (a) What is meant by hybridisation of atomic orbitals?
(b) Which hybrid orbitals are used by carbon atoms in the following molecules?
(i) CH_3CHO (ii) CH_3COOH
15. (a) On the basis of quantum numbers, justify that the sixth period of the periodic table should have 32 elements.
(b) write the electronic configuration of Cr (atomic number 24).
16. Discuss the shape of the following molecules using the VSEPR model.
(a) BCl₃ (b) AsF₃ (c) SF₆ (d) SF₄.
17. Define electronegativity. How does it differ from electron gain enthalpy?
OR
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(c) Draw the shape of $d(x^2-y^2)$ orbital.
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21. How much magnesium sulphide can be obtained from 2.00 g of magnesium and 2.00 g of sulphur by the reaction $\text{Mg} + \text{S} \rightarrow \text{MgS}$. ? Which is the limiting reagent? Calculate the amount of one of the reactants which remains unreacted?
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24. An organic compound on analysis gave the following data: C = 57.82%, H=3.6% and the rest is Oxygen. Its molecular mass is 166. Find its empirical and molecular formula. (H=1u, C=12u, O=16u)

(2)

25. (a) What are the frequency and wave length of a photon emitted during a transition from $n=5$ state to the $n=2$ state in the hydrogen atom?
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