

Winter holiday homework

Sub: Chemistry (Estimated time to complete 3 to 4 hours)

1. If the mass of air at sea level is 1034 g/cm^2 , calculate the pressure in pascal?
2. What is the IUPAC name of the element with atomic number 109?
3. Define limiting reagent. How many significant figure are there in 12600?
4. Differentiate molarity and molality. What is the effect of temp on these?
5. State Heisenberg's uncertainty principle.
6. State Modern periodic law.
7. What are isoelectronic species? Give example.
8. State Fajan's rule.
9. Define Boyle's temperature. Predict the sign of entropy change in $\text{H}_2\text{O}(\text{g}) \rightarrow \text{H}_2\text{O}(\text{l})$
10. What is the IUPAC name of the compound $\text{CH}_2=\text{CH}-\text{C}\equiv\text{C}-\text{CH}_3$?
11. Table tennis ball has a mass 10 g and a speed of 90 m/s. If speed can be measured within an accuracy of 4% what will be the uncertainty in speed and position?
12. How many sub-shells are associated with $n=4$? How many electrons will be present in the subshells having $m_s = \frac{1}{2}$ and $n = 4$
13. What do you mean by 10 volume H_2O_2 ?
14. What is demineralised water?.
15. Derive the relation $\text{pH} + \text{pOH} = 14$
16. Explain: (i) BeO is insoluble but BeSO_4 is soluble in water. (ii) LiI is more soluble than KI in ethanol?
17. Define electrophiles and nucleophiles giving suitable examples.
18. If the velocity of the electron in Bohr's first orbit is $2.19 \times 10^6 \text{ m/s}$. Calculate de-Broglie wave length associated with it.
19. Define Buffer solution.
20. Define common ion effect.
21. Why does benzene undergoes electrophilic reaction?
22. What do you mean by ozone hole?. What are its ill effect?
23. 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.
24. Arrange in ascending order as per property indicated
 - a) B, Al, Mg, K (Metallic character)
 - b) B, C, Si, N, F (Non metallic character)F, Cl, O, N (Oxidizing property)
25. Write the resonance structures for SO_3 , NO_2 , and NO_3^-
26. Write electronic configuration of following species and calculate it bond order O_2 , O_2^+ , O_2^-
27. Using the equation $Pv = nRT$, show that at a given temp density of a gas is proportional to gas pressure p.
28. Prove that $C_p - C_v = R$ for 1 mole of a gas. Write this relation for 0.3mole of gas.
29. Balance the equation

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- a) $\text{MnO}_4^- + \text{I}^- = \text{MnO}_2 + \text{I}_2$ In basic medium $\text{MnO}_4^- + 2\text{H}_2\text{O} + 3\text{e}^- \rightarrow \text{MnO}_2 + 4\text{OH}^-$, $2\text{I}^- \rightarrow \text{I}_2 + 2\text{e}^-$
- b) $\text{H}_2\text{O}_2 + \text{Fe}^{2+} = \text{Fe}^{3+} + \text{H}_2\text{O}$ in acid medium
- c) $\text{Cr}_2\text{O}_7^{2-} + \text{SO}_2 = \text{Cr}^{3+} + \text{SO}_4^{2-}$ in acid medium
30. What do you mean by the term
(i) hydrogenation (ii) syn gas (iii) fuel cell (iv) Producer gas
31. What happens when
a) Sodium metal is dropped in water
b) Quicklime is heated with silica
c) Chlorine reacts with slaked lime
32. A sample of 0.50 g of an organic compound was treated according to Kjeldahl method. The ammonia evolved was absorbed in 50 mL of 0.5 M H_2SO_4 . The residual acid required 60 mL of 0.5 M solution of NaOH for neutralization. Find the percentage composition of nitrogen in the compound.
33. Explain the following term
a) Crystallisation
b) Distillation
c) Chromatography
34. A farmer was using pesticides on his farm. He used the product of his farm as food for rearing fishes. He was told that fishes were not fit for human consumption because large amount of pesticides had accumulated in the tissues of fishes. Explain how did this happen? Which value we learn from incident?
35. Define solubility product. What is the maximum concentration of equimolar solutions of ferrous sulphate and sodium sulphide so that when mixed in equal volumes there is no ppt formation of iron sulphide? ($K_{sp} = 6.3 \times 10^{-18}$)
36. (i) How will you convert following in benzene
a) Ethyne
b) Ethene
c) Hexane

(ii) Draw the cis and trans structures of hex-2-ene. Which isomer will have higher b.p?
37. Answer the following :-
(a) Carbon monoxide is more dangerous than carbon dioxide. Why?
(b) Taj Mahal in India is affected by acid rain. How?
(c) What is B.O.D?
(d) What is photochemical smog?
38. At a sweet shop in Dilshad Nagar, Rahul bought some sweets. He requested the sales girl to put the sweet box in a polythene bag. The sales girl refused to do so. Instead, she kept the sweet in a paper bag. After reading the above passage answer the following

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- (a) Why did the girl refused to put the sweets box in the polythene bag
- (b) As a student of chemistry, why would you advocate the use of paper instead of polythene bag?
- (c) Which value is promoted through the use of paper bag?
- (d) Suggest one activity to promote these values.

39. Explain the following with reaction only

- (i) Markownikov rule
- (ii) Wurtz reaction
- (iii) Friedel craft reaction
- (iv) β -elimination reaction
- (v) Isomerisation reaction

40. Water is most important for our survival. Plants need water for their growth. We need water for drinking, taking bath, etc.,. But water in the lake, river, etc. Is not clean for all purposes. ocean though contain about 70% of the earth surface but being salty is unfit for human consumption. In a number of ways, we are responsible for causing water pollution Being a good citizen; we should stop doing things leading to water pollution.

- (i) There was a time when people in rural area used to use well water for drinking but it is not advisable now? How is it getting polluted?
- (ii) Our religion suggests taking bath in Gangs or even Drinking it. What are your views as a student of science? What do you suggest should be done?
- (iii) How sometimes sea water gets polluted to the extent that aquatic life including fish die?
- (iv) How does the use of fertilizer affect the aquatic life in the lake and other water bodies?
- (v) Why 1ppm of fluoride is added to drinking water? What will happen if concentration is higher?
- (vi) Why lead pipes should not be used for transport of water?
- (vii) What is the safest pH range for drinking water?