

Tamrakar Sir's

ANAND ACADEMY

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* SHOP NO - 321, ZONAL MARKET, SECTOR-10, BHILAI *
ASSIGNMENT - [ELECTROSTATICS & CURRENT ELECTRICITY]

1. What do you understand by quantization of charge?
2. Define intensity of an electric field. Write its SI unit. Find its dimensional formula.
3. The tyres of an aeroplane are made a little bit conductor. Why?
4. What is electric dipole? Define electric dipole moment and write its SI unit.
5. What is Ohm's law? Write its limits?
6. Define potential gradient of a potentiometer. Write its unit.
7. Explain superconductivity.
8. What is the effect of temperature of resistivity of metals and semiconductors?
9. What do you understand by equipotential surface? Write its properties.
10. Which is better for the measurement of potential difference, a voltmeter or a potentiometer? Why?
11. What is internal resistance of a cell? Establish the relationship between internal resistance, e.m.f. and external resistance.
12. What is meant by specific resistance? On what factors does it depend?
13. State and explain Kirchhoff's laws.
14. Derive an expression for the capacity of a spherical conductor.
15. Write Coulomb's law for electrostatics and hence define unit charge.
16. Define electric lines of force. State the properties of electric lines of force.
17. Derive an expression for the torque acting on the dipole placed in a uniform electric field.
18. State and prove Gauss' law. Derive Coulomb's inverse-square law from it.
19. Derive the expression of Wheatstone bridge by Kirchhoff's law.
20. Derive an expression for potential energy of a dipole in a uniform electric field.
21. Find an expression for the intensity of electric field at a point due to uniformly charged infinite sheet.
22. Derive the expression for the capacity of a spherical capacitor.
23. Three capacitors of capacitance C_1 , C_2 , C_3 are connected in series and parallel. Find the equivalent capacitance for each.
24. Obtain an expression for the intensity of electric field at a point due to a linear charged conductor.
25. Derive an expression for electric field intensity at a point on the axial (end on) position of an electric dipole.
26. Using Gauss' law, find the electric field intensity due to a uniformly charged spherical shell at a point which lies:
(i) outside the sphere, (ii) on the surface of sphere, (iii) inside the sphere.
27. Derive an expression for the electric potential due to a charge q at a distance r .
28. Derive an expression for the capacity of a parallel plate capacitor. What will be the effect if the medium between the plates is filled by a dielectric medium?
29. Prove that when two charged conductors are connected, there will be a loss of energy.
30. Explain an experiment to determine the specific resistance of a wire with the help of metre bridge on the following points:
(i) Electrical diagram, (ii) Derivation of formula, (iii) Observation table, (iv) Precautions
31. Determine an experiment to find out the internal resistance of a cell by potentiometer under the following points:
(i) Electrical diagram, (ii) Derivation of formula, (iii) Observation table, (iv) Precautions

Best of luck

Admission Open – REVISION COURSE (DEC+JAN) & TEST SERIES

IIT, AIEEE, PET, PMT, 10th, 11th, 12th
PHYSICS, CHEMISTRY, MATHS, COMMERCE
HOSTEL FACILITIES AVAILABLE

1. What is common ion effect ?
2. Why is the solution of CH_3COONa alkaline in nature ? explain
3. What is neutralization ? Give one example.
4. What is the relation between pH, pOH and pK_w ?
5. Give conjugate acid of the following : (i) CO_3^{2-} (ii) HCO_3^- (iii) HSO_4^- (iv) OH^- (v) Mn^{2+}
6. What do you understand by the pH of a solution ? What is the pH of a neutral solution ?
7. Give relationship between solubility and solubility product ?
8. What is standard free energy change ?
9. Entropy change will be negative or positive in the reaction $\text{H}_2\text{O}_{(l)} \rightarrow \text{H}_2\text{O}_{(g)}$
10. Write the second law of thermodynamics and explain its necessity.
11. What is entropy ? Explain entropy change with the help of one example.
12. What do you understand by free energy of a system ?
13. Enthalpy change in vaporization of water is 40.8 kJ mol^{-1} . Calculate entropy change in this process. The boiling point of water is 373 K.
14. Establish a relation between Gibbs free energy and cell potential.
15. Explain the state of a chemical reaction when (i) $G = 0$, (ii) $\Delta G < 0$ and (iii) $\Delta G > 0$.
16. What will be the value of ΔG , when any process is in equilibrium ?
17. Derive Henderson's equation to calculate pH.
18. What is solubility product ? Write any five applications of solubility product.
19. Define the following with one example each (a) Lewis acid & base (c) Conjugate acid & base.
20. What are buffer solutions ? Explain the buffer action of acidic & basic buffer solution.
21. What is the law of conservation of energy ? Write the mathematical relation between heat, internal energy and work.
22. What is free energy ? At constant temperature, prove that $\Delta G = \Delta H - T\Delta S$.
23. Write the third law of thermodynamics and give its importance
24. Calculate the standard free energy change at 298 K for the reaction,
 $\text{N}_2(\text{g}) + 3\text{H}_2 \rightarrow 2\text{NH}_3(\text{g})$, $\Delta H^\circ = -92.4 \text{ kJ}$ and $\Delta S^\circ = -198.3 \text{ JK}^{-1} \text{ mol}^{-1}$.
25. The standard free energy change for a reaction $2\text{H}_2 + \text{O}_2 \rightarrow 2\text{H}_2\text{O}_{(l)}$ is -474.3 kJ at 298 K. Calculate the equilibrium constant.
26. The values of ΔH and ΔS for two reactions are given :
Reaction A : $\Delta H = -10.5 \times 10^3 \text{ J mol}^{-1}$, $\Delta S = +31 \text{ JK}^{-1} \text{ mol}^{-1}$
Reaction B : $\Delta H = -11.7 \times 10^3 \text{ J mol}^{-1}$, $\Delta S = -105 \text{ JK}^{-1} \text{ mol}^{-1}$
Show whether these reactions are spontaneous or not at 298 K
27. Show that decrease in free energy in a reaction is equal to the useful work.
28. Explain how the spontaneity of the reaction can be predicted from the value of decrease in free energy of the system.

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REVISION COURSE (Dec + Jan)

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ASSIGNMENT - [12 th OPTICS]

1. How does an air bubble behave inside the water? Why does sky appear blue? What will it look from moon?
2. What do you mean by power of a lens? What are conjugate focus?
3. Write differences between compound microscope and astronomical telescope.
4. The moon is several times smaller than sun. Even then at the time of eclipse, the entire sun is covered by moon. How ?
5. A compound microscope is seen through its objective lens, will it behave as telescope?
6. What do you mean by the resolving power of a telescope?
7. What do you mean by the resolving power of a microscope?
8. Sun appears red during the sunrise and sunset, why?
9. What will be the effect on the angle of minimum deviation of prism when it is immersed in water?
10. Explain angular dispersion. Derive formula for dispersive power.
11. What are Fraunhofer lines? Why are they present in solar spectrum? Write their uses.
12. What is pure spectrum? What are the conditions to obtain pure spectrum?
13. If a lens is immersed in water, then what will be change in its power?
14. Derive the Newton's formula for a lens.
15. In displacement method, the distance between two pins should be greater than four times that of the focal length of lens, why?
16. In displacement method, establish the relation between height of object and image.
17. What do you mean by magnifying power? Explain linear magnification of a lens?
18. Establish the formula for the focal length of the combination of two thin lenses.
19. State and prove the lens formula for a lens.
20. What is lens maker formula? Derive it.
21. Prove for any spherical refracting surface: $\frac{\mu - 1}{R} = \frac{\mu}{v} - \frac{1}{u}$, where symbols have their usual meanings.
22. Draw the ray diagram of simple microscope and obtain an expression for its magnifying power.
23. Draw the ray diagram of compound microscope and obtain an expression for its magnifying power.
24. Draw the ray diagram of terrestrial telescope and obtain an expression for its magnifying power.
25. Draw the ray diagram of astronomical telescope and obtain an expression for its magnifying power.
26. Describe the displacement method to determine the focal length of a convex lens on the following points:
(i) Ray diagram (ii) Principle and formula derivation (iii) Observation table (iv) Precautions.
27. Establish the relation between the angle of prism for deviation without dispersion with labelled diagram. Calculate the total deviation produced.
28. Prove that $\mu = \frac{\sin \frac{A}{2}}{\sin \frac{A - \delta_m}{2}}$. Write symbols have their usual meanings.
29. Establish relation between angles for the dispersion without deviation and hence obtain the expression for resultant dispersion.
30. What is emission spectrum? State the kinds of emission spectrum.
31. What is absorption spectrum? Explain.
32. Why are satellites used for long distance T.V. transmission?
33. What are coherent sources of light? Write the conditions to obtain it.
34. Light rays can be polarized but sound waves can't. Why?
35. What do you understand by polarization of light?
36. Why do bubbles of colourless soap appear to be coloured?
37. What are optical fibers? Write its construction, working and uses.
38. What is total internal reflection of light? Write the conditions for it. Prove that $\mu = \text{cosec } i_c$.
39. What are Polaroids? Write its construction, working and uses.
40. What is interference of light? Write the types and the necessary conditions for it.
41. Explain Huygens' theory of secondary wavelets.
42. Obtain a relation between height of T. V. tower and distance of transmission.
43. State Brewster's law. Prove that at angle of polarization, reflected rays and refracted rays are mutually perpendicular.
44. Derive formula for the fringe width in Young's double-slit experiment.

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ASSIGNMENT - 12th [NUCLEAR CHEMISTRY]

1. Explain the principle of the atomic bomb.
2. How will you determine the age of an old wood ?
3. Describe radiocarbon dating.
4. Establish relation between radioactive disintegration constant and half life period.
5. What is mass defect ? Explain binding energy on the basis of mass defect.
6. What is artificial transmutation ? Classify this type of nuclear reactions.
7. Describe nuclear reactor with diagram.
8. Compare the properties of radioactive rays.
9. Give meson theory of nuclear structure.
10. What do you understand by half life period of radioactive element ? Explain.
11. Give the uses of radioisotopes in photosynthesis.
12. Calculate the number of α - and β -particle emitted when ${}_{92}\text{U}^{238}$ is transformed into ${}_{82}\text{Pb}^{206}$ by radioactive disintegration.
13. What is group displacement law ? Explain giving exaple.
14. Write the difference between nuclear fission and nuclear fusion reaction.
15. What is tracer technique ? Write its applications.
16. Calculate the age of wood sample which gives 7.0 count per minute of ${}^6\text{C}^{14}$. The fresh wood sample provides 15.3 count per minute of ${}^6\text{C}^{14}$. Half life period of ${}^6\text{C}^{14}$ is 5770 years.
17. An old wooden article has only 40% as much C-14 activity as a fresh piece of wood. Calculate how old is the wooden article ? Given, $t_{1/2}$ for C-14 = 5760 years.
18. An element has atomic number 90 and mass number 236. This element emits 4 α - and 2 β -particles. Find out the atomic number and mass number of the new element formed.

CHEMICAL KINETICS

1. Give the example of pseudo first order reaction.
2. What is activation & threshold energy ?
3. Define temperature coefficient.
4. Give relation between half life period and rate constant.
5. Give difference between molecularity and order of reaction.
6. How does rate of reaction depend on concentration ?
7. What is first & zero order reaction ? Explain with example .
8. What is the unit of first & third order reaction? Is zero value of order of reaction possible ? If yes, then give one example.
9. What is order of reaction ? Prove that half life period of first order reaction does not depend upon initial concentration.
10. Give Arrhenius equation and write its application.
11. What is the effect of temperature on the velocity and velocity constant. Explain your answer.
12. Derive integrated rate equation for first order reaction.
13. What is energy of activation ? How is it determined ?
14. Draw a sketch of endothermic reaction and explain energy of activation and activated complex.
15. At 68 K, CH_3CO decomposes as $\text{CH}_3\text{CHO}_{(g)} \rightarrow \text{CH}_4_{(g)} + \text{CO}_{(g)}$. If the rate of dissociation is measured by measuring the partial pressure of CH_3CHO , the rate of the reaction is,
$$-\frac{dp(\text{CH}_3\text{CHO})}{dt} = k_p (\text{CH}_3\text{CHO})^{3/2}$$

If pressure is measured in atom and time in minute, then find out :

1. Unit of rate of the reaction. 2. Unit of rate constant k.
16. Calculate the activation energy for the decomposition in a decomposition reaction in which the value of slope obtained is -9920 when $\log k$ is plotted against $1/T$.
17. Write the name of methods used for experimental determination of order of reaction. Explain any two

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ASSIGNMENT - 12th

P-block - I

1. What is fuming nitric acid ?
2. What is aqua regia ? How it dissolves gold ?
3. What are chalcogens ? Name them.
4. How is colloidal sulphur prepared ?
5. Write name and chemical formulae of two ores of phosphorus.
6. Nitrogen does not form pentahalide as phosphorus.
7. What happens when : (i) Sulphur is boiled with caustic soda. (ii) H_2S is passed in aqueous solution of SO_2 .
8. What is an antichlor ?
9. Explain Haber's process for the manufacture of ammonia.
10. Write the name, chemical formula, and structure of oxides of nitrogen.
11. Distinguish between white and red phosphorus.
12. How is phosphine gas prepared in the laboratory ? Explain.
13. Bleaching of powders is permanent by Cl_2 but temporary by SO_2 . Why ?
14. The contact process is better than lead chamber process for the manufacture of H_2SO_4 . Why ?
15. Write a note of oxyacids of phosphorus along with their structure.
16. What happens when SO_2 is passed in acidic solution of $K_2Cr_2O_7$?
17. (1) Boiling point of NH_3 is higher than PH_3 , why ?
(2) Discuss the stability of hydrides of group 15th elements.
18. What is Nessler's reagent ? How does ammonia react with it ?
19. Explain Ostwald method for the manufacture of nitric acid.
20. Explain contact process for the manufacture of sulphuric acid.
21. Explain the manufacture of ozone by Siemens-Halske's ozonizer.
22. Explain the preparation of ozone by Siemens' ozonizer and Brodie's ozonizer.

P-block - II

1. What are Halogen ? Give examples.
2. Why are noble gas inert ? Give any three reasons.
3. Fluorine shows only -1 oxidation state. Why ?
4. Electron affinity of chlorine is higher than that of fluorine. Why ?
5. Write general outer electronic configuration of noble gases. Why these are chemically inert ?
6. Give reason : (i) Noble gases are monoatomic. (ii) Ionization energy of noble gases is highest. (iii) Noble gases have zero electron affinity.
7. Explain Dewar's method of preparation of inert gases.
8. Write a note on interhalogen compounds along with their structure.
9. Explain the manufacture of chlorine by Nelson cell.
10. Explain modern method for the preparation of bleaching powder.
11. Why are elements of 17th group called halogens ? Explain the trend in following properties of halogen :
(i) Oxidation states (ii) Electronegativity (iii) Oxidizing power (iv) bond formation with other elements.
12. Discuss the behaviour of hydrides of halogens on the following points : (i) Physical state (ii) Thermal stability (iii) Reducing properties (iv) acid strength.
13. What are clathrates ?
14. Write the structure of oxyacids of chlorine.
15. How does bleaching powder react with excess of dilute acid ? Explain. What is the utility of the reaction ?
16. Write the oxyacids of chlorine in the increasing order of their acidic strength. Explain the reason for it.
17. Write formulae and structure of compounds of xenon.
18. What is Inert pair effect ? Explain with suitable example.