1. Which one of the following changes when catalyst is used in a reaction
(a) Heat of reaction (b) Product of reaction
(c) Equilibrium constant (d) Activation energy

2. In the titration between oxalic acid and acidified potassium permanganate, the manganous salt formed catalyses the reaction. The manganous salt is
(a) A promoter (b) A positive catalyst
(c) An autocatalyst (d) None of these

3. Which of the following reaction is catalysed by enzyme maltase
(a) Starch $\rightarrow$ maltose
(b) Maltose $\rightarrow$ glucose
(c) Lactose $\rightarrow$ maltose
(d) Maltose $\rightarrow$ glucose + fructose

4. Platinized asbestos is used as a catalyst in the manufacture of H_2SO_4 . It is an example of
(a) Heterogeneous catalyst (b) Autocatalyst
(c) Homogenous catalyst (d) Induced catalyst

5. Addition of catalyst in a system
(a) Increases equilibrium concentrations
(b) No effect on equilibrium concentrations
(c) Decreases equilibrium concentrations
(d) Increases rate of forward reaction and decreases rate of backward reaction

6. Which of the statement is wrong among the following
(a) Haber's process of NH_3 requires iron as catalyst
(b) Friedel–Craft's reaction uses anhydrous $AlCl_3$
(c) Hydrogenation of oils uses iron as catalyst
(d) Oxidation of SO_2 to SO_3 requires V_2O_5

7. A biological catalyst is essentially
(a) An amino acid (b) A carbohydrate
(c) The nitrogen molecule (d) An enzyme

8. The components of Zigler Natta catalyst, used in the polymerisation of propylene, are
(a) $TiCl_3 + Al(C_2H_5)_3$ (b) $TiCl_4 + Al(C_2H_5)_3$
(c) $Ti(C_2H_5)_3 + AlCl_3$ (d) $Ti(C_2H_5)_4 + AlCl_3$

9. Which of the following statements is wrong
(a) Catalysts can aid a rapid reaching of the equilibrium position, but do not change the position of the equilibrium
(b) Homogeneous catalysis generally involves an equilibrium reaction between at least one of the reactants and the catalyst
(c) Heterogeneous catalysis involves chemisorption on the surface of the catalyst
(d) Positive catalysts raise the energy of activation of the reaction they catalyse

10. In the redox reaction

$2MnO_4^- + 5C_2O_4^{2-} + 16H^+ \rightleftharpoons 2Mn^{2+} + 10CO_2 + 8H_2O$

The ion acting as autocatalyst is

(a) MnO_4^- (b) $C_2O_4^{2-}$

(c) H^+ (d) Mn^{2+}

11. Catalyst used in the oxidation of $SO_2 \rightarrow SO_3$

(a) Nickel (b) $ZnO.Cr_2O_3$

(c) V_2O_5 (d) Iron

12. Adam's catalyst is

(a) Platinum (b) Iron

(c) Molybdenum (d) Nickel

13. Wilhem Ostwald redefined the action of

(a) Anamers

(b) Isomers

(c) Catalyst

(d) Geometry of monomers

14. A catalyst is used to

(a) Increase the product

(b) Increase or decrease the rate of reaction

(c) Increase or decrease the products

(d) Decrease the products

15. Which of the following is true about catalyst

(a) It initiates reaction

(b) It changes equilibrium point

(c) It increase average kinetic energy

(d) It accelerates the rate of reaction

16. Physical adsorption

(a) Involves the weak attractive interaction between the adsorbent and adsorbate

(b) Involves the chemical interactions between the adsorbent and adsorbate

(c) Is irreversible in nature

(d) Increases with increase of temperature

17. In the adsorption of acetic acid on activated charcoal, the acetic acid is an

(a) Adsorber (b) Absorber

(c) Adsorbent (d) Adsorbate

18. Which one of the following statement is not correct

(a) The extent of adsorption depends on the nature of the adsorbent and adsorbate

(b) The extent of adsorption depends on the pressure of the gas

(c) The extent of adsorption depends on the temperature

(d) The extent of adsorption has no upper limit

19. According to Langmuir adsorption isotherm, the amount of gas adsorbed at very high pressures
(a) Reaches a constant limiting value
(b) Goes on increasing with pressure
(c) Goes on decreasing with pressure
(d) Increases first and decreases later with pressure

20. Adsorption is phenomenon is which a substance
(a) Goes into the body of the other substance
(b) Remains close the other substance
(c) Accumulates on the surface of the other substance
(d) None of these

21. Adsorption increase when
(a) Temperature increases
(b) Temperature decreases
(c) Temperature remains constant
(d) None of these

22. The adsorption of a gas on a solid surface varies with pressure of the gas in which of the following manner
(a) Fast $\rightarrow$ slow $\rightarrow$ independent of the pressure
(b) Slow $\rightarrow$ fast $\rightarrow$ independent of the pressure
(c) Independent of the pressure $\rightarrow$ fast $\rightarrow$ slow
(d) Independent of the pressure $\rightarrow$ slow $\rightarrow$ fast

23. The colloidal system consisting of a liquid adsorbent in a solid adsorbate is termed as
(a) Aerosol (b) Sol
(c) Foam (d) Gel

24. According to the adsorption theory of catalysis, the speed of the reaction increases because
(a) Adsorption lowers the activation energy of the reaction
(b) The concentration of reactant molecules at the active centres of the catalyst becomes high due to adsorption
(c) In the process of adsorption, the activation energy of the molecules becomes large
(d) Adsorption produces heat which increases the speed of the reaction

25. Which one of the following characteristics is not correct for physical adsorption
(a) Adsorption on solids is reversible
(b) Adsorption increases with increase in temperature
(c) Adsorption is spontaneous
(d) Both enthalpy and entropy of adsorption are negative

26. Adsorption due to strong chemical forces is called
(a) Chemisorption (b) Physiosorption
(c) Reversible adsorption (d) Both (b) and (c)

27. 50 *ml* of 1 *M* oxalic acid is shaken with 0.5 *gm* of wood charcoal. The final concentration of the solution after adsorption is 0.5 *M*. Amount of oxalic acid absorbed per *gm* of charcoal is
(a) 3.45 *gm* (b) 3.15 *gm*

(c) 6.30 *gm* (d) None

28. Noble gases are adsorbed by
(a) Anhydrous calcium chloride
(b) Ferric hydroxide
(c) Conc. H_2SO_4
(d) Activated coconut charcol

29. What will be the effect of increase in temperature on physical adsorption
(a) It will decrease
(b) It will increase
(c) First increase then decrease
(d) None of these

30. The extent of adsorption of a gas on a solid depends on
(a) Nature of the gas (b) Pressure of the gas
(c) Temperature of the gas (d) All are correct

1. (d) Activation energy changes when catalyst is used in a reaction.

2. (c)

3. (b) $\text{Maltose} \xrightarrow[\text{enzyme}]{\text{Maltase}} \text{Glucose}$

4. (a) $\underset{(g)}{2SO_2} + \underset{(g)}{O_2} \xrightarrow[\underset{(s)}{\text{Asbestose}}]{\text{Platinized}} 2SO_3$; Example of heterogeneous catalyst.

5. (b) Catalyst is not effect on equilibrium concentrations.

6. (c)

7. (d)

8. (b) $\underset{\text{Propylene}}{nCH_3 - CH = CH_2} \xrightarrow{(CH_3CH_2)_3Al + TiCl_4}$

$$\underset{\text{Polypropylene}}{\left[\begin{array}{c} CH_3 \\ | \\ -CH_2 - CH - \end{array}\right]_n}$$

9. (d)

10. (d) Mn^{++} is a product in reaction so it is auto catalyst (according to definition).

11. (c) $2SO_2 + O_2 \xrightarrow[(\text{Catalyst})]{V_2O_5} 2SO_3$

12. (a) Generally transition elements acts as catalysts. Adam's catalyst is another name of platinum.

13. (c)

14. (b) Catalyst is a substance which changes the rate of reaction without affecting the overall energetics of the reaction.

15. (d) Catalyst is a substance which changes the rate of reaction without affecting the overall energetics of the reaction.

16. (a)

17. (d)

18. (d)

19. (a) According to langmuir Adsorption isotherm the amount of gas adsorbed at very high pressures reaches a constant limiting volume.

20. (c)

21. (b) Adsorption increase when temperature decreases (Adsorption $\propto$ 1/Temperature)

22. (a) Adsorption of a gas on solid independent of the pressure start fast and after some time becomes slow.

23. (b)

24. (a)

25. (b)

26. (a) Adsorption due to strong chemical bond is called chemical adsorption or chemisorption or Langmuir adsorption.

27. (c) $W = \frac{126 \times 1 \times 50}{1000} \Rightarrow 6.3$

(Molecular weight of oxalic acid $\Rightarrow$163)

$0.5\ gm \rightarrow \frac{6.3}{2}$

$1\ gm \rightarrow \frac{6.3}{2 \times 0.5} \times 1 \Rightarrow 6.3\ gm.$

28. (d) Noble gases are adsorbed by coconut charcoal. The adsorption of different noble gases occur at different temperatures, hence charcoal is used to separate these gases. Helium is not adsorbed by charcoal (as it is very difficulty liquifiable gas).

29. (a) Since adsorption is an exothermic process (taking place with the evolution of heat) therefore in accordance with Lechatelier's principle, the magnitude of physical adsorption will decrease with the increase in temperature. In case of chemisorption the adsorption first increase and then decreases with increase in temperature.

30. (d)