A

1 **The vapor pressure of pure benzene (C_6H_6) and toluene (C_7H_8) at 25 ºC are 96 and 24 mmHg respectively. A solution is prepared in which a mole fraction of benzene and toluene are both 0.5.**

What are the vapor pressure of the benzene and toluene above this solution?

A) 90
B) 15
C) 30
D) 60
E) 7.5

2 **The volume of a large, irregularly, shaped, closed tank is determined as follows. The tank is first evacuated and then it is connected to 50 L cylinder of compressed nitrogen gas. The gas pressure in the cylinder, originally at 2 atm., fall to 30 atm. after it is connected to evacuated tank.**

What is the volume of tank?

A) 700
B) 800
C) 600
D) 500
E) 350

3 **What is the mass of 1L of cyclopropane (C_3H_6) when measured at STP? (C:12, H:1)**

A) 2.88
B) 4.88
C) 3.88
D) 1.88
E) 0.88

A

4 **Suppose that at same particular point in the hypothetical reaction**
$A + 3B \rightarrow 2C + 2D$

we found that the concentration of A is 1 M, i.e. [A] = 1.000 M suppose that exactly 1 minute later [A] = 0.9982 M, what is the rate of reaction expressed in mol/L.s

A) 4.5×10^{-5}
B) 1.8×10^{-3}
C) 6×10^{-5}
D) 3×10^{-5}
E) 9×10^{-5}

5 **Suppose that at same particular point in the hypothetical reaction**
$A + 3B \rightarrow 2C + 2D$

we found that the concentration of A is 1M, i.e. [A] = 1.000 M suppose that exactly 1 minute later [A] = 0.9982 M,what is the rate of reaction, expressed in mol/L.min

A) 0.9×10^{-3}
B) 1.8×10^{-3}
C) 9.982×10^{-1}
D) 3.6×10^{-3}
E) 9×10^{3}

A

6 **Suppose that at same particular point in the hypothetical reaction**
A + 3B → 2C + 2D

we found that the concentration of A is 1 M, i.e. [A] = 1.000 M suppose that exactly 1 minute later [A] = 0.9982 M, what is the rate of formation of C?

A) 5.4×10^{-3}
B) 7.2×10^{-3}
C) 3.6×10^{-3}
D) 1.8×10^{-3}
E) 9×10^{-4}

7 **Nicotine extracted from tobacco leaves, is completely miscible with water at temperature below 60 ºC. What is the molality of nicotine in an aqueous solution that begins to freeze at -0.465 ºC? (K_f =1.86 ºC.kg water/mol solution)**

A) 0.048
B) 0.25
C) 0.024
D) 0.096
E) 0.5

8 **Ethanol is the common grain alcohol. An ethanol-water solution is prepared by dissolving 10cm^3 of ethanol, C_2H_5OH (d =0.789 g/ml), in a sufficient value of water to produce 100cm^3 of solution having a density of 0.982 g/ml. what is the concentration of this solution, expressed as percent (mass/vol).**

A) 8.03
B) 12.45
C) 7.89
D) 12.67
E) 10

A

9 **The reaction**
$4Al(s)+3O_2(g) \rightarrow 2Al_2O_3(s)$ $\Delta H^0 = -3351$ kJ
is ....., and therefore heat is ..... by the reaction.

A) endothermic, released
B) endothermic, absorbed
C) exothermic, released
D) exothermic, absorbed
E) thermoneutral, neither released nor absorbed

10 $2C_6H_6(l) + 15O_2(g) \neg 12CO_2(g) + 6H_2O(l)$

The value of DH^0 for the reaction below is -6535 kJ. How many kJ of heat are released in the combustion of 7.8 g of C_6H_6 (l)? (C:12, H:1 g/mole)

A) 6.25×10^2
B) -6500
C) 3.25×10^3
D) 3.25×10^2
E) 1.34×10^3

11 $2Na_2O_2(s) + 2H_2O(l) \rightarrow 4NaOH(s) + O_2(g)$

The value of DH^0 for the reaction below is -126 kJ. How much heat (in kJ) is released when 2.00 mol of NaOH is formed in the reaction?

A) 7.8
B) -126
C) 63
D) 252
E) 3.9

A

12 Calculate the ΔHrxn for the following reaction:

$C_2H_4(g) + 3O_2(g) \rightarrow 2CO_2(g) + 2H_2O(l)$

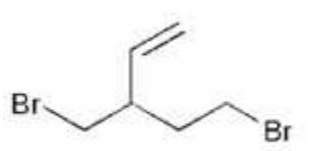
$\Delta H°_f$ $C_2H_4(g)$ = 226.6 kJ/mol
$\Delta H°_f$ $CO_2(g)$ = -393.5 kJ/mol
$\Delta H°_f$ $H_2O(l)$ = -285.8 kJ/mol

A) 1358.6
B) 1358.6
C) -1132
D) -1585.2
E) 1585.2

13 **Give appropriate IUPAC name for the compound $CH_3C(CH_3)_2CH_2CH(CH_3)CH_3$.**

A) 2,2,4trimethyl pentene
B) 2,2,4triethyl propane
C) 2,2,4trimethyl octane
D) 2,2 dimethyl hexane
E) 2,2,4trimethyl pentane

14

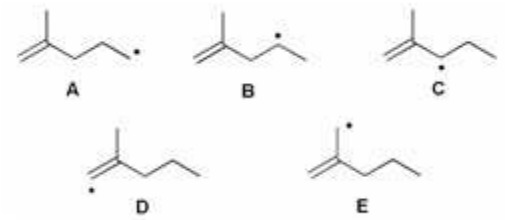


What is the IUAPAC name for:

A) 1,4-dibromo-3-ethenylbutane
B) 5-bromo-3-(bromomethyl)pent-1-ene
C) 3-(1-bromopropyl)-4-bromobut-1-ene
D) 1,4-dibromo-2-ethenylbutane
E) None of the above

A

15



Which of the following free radicals is most stable?

A) A
B) C
C) B
D) D
E) E

16 **How many structural isomers are there for hexane, C_6H_{14}?**

A) 2
B) 4
C) 5
D) 3
E) 6

17

$CO_{(g)} + 2H_{2\,(g)} \rightleftharpoons CH_3OH_{(g)}$ $K_C = 15$

Equilibrium is established in this reaction. These equilibrium concentration are measured [CO]= 1M,

[CH_3OH]= 0.15M. What is the equilibrium concentration of [H_2]?

A) 1
B) 0.01
C) 0.1
D) 0.001
E) 10

A

18 For the water-gas shift reaction

$CO_{(g)} + H_2O_{(g)} \rightleftharpoons CO_{2(g)} + H_{2(g)}$

Kc = 1.5 at about 1000K.

The following amount of substance are brought together and allowed to react at 1000K.
1 mol CO, 1 mol H_2O, 2 mol CO_2 and 2 mol H_2.
Compared to their initial amounts, which of the substances will be present in grater when equilibrium is established?

A) CO and H_2O
B) CO_2 and H_2
C) H_2O and H_2
D) CO and CO_2
E) CO_2 and H_2O

19 **Nitrogen and oxygen can combine to form either NO (g) or N_2O (g)**

$N_{2(g)} + O_{2(g)} \rightleftharpoons 2NO_{(g)}$

Kc = $4x10^{-31}$

$N_{2(g)} + 1/2\ O_{2(g)} \rightleftharpoons N_2O_{(g)}$

Kc = $2.5x10^{-18}$

Also, $N_2O_{(g)}$ can react with oxygen to produce $NO_{(g)}$.

$N_2O_{(g)} + 1/2\ O_{2(g)} \rightleftharpoons NO_{(g)}$ **Kc= ?**

A) $1.6*10^{-12}$
B) $1.6*10^{-13}$
C) $1.6*10^{-14}$
D) $1.6*10^{-3}$
E) $1.6*10^{+3}$

A

20 Ammonium compounds dissociate when heated.
Ammonium hydrogen sulfide, $NH_4HS_{(S)}$ dissociates at room temperature

$NH_4HS_{(S)} \rightleftharpoons NH_3 + H_2S$

Kp (atm) = 0.09 at 25 ºC
A sample of $NH_4HS_{(S)}$ is introduced into an evacuated flask and allowed to established equilibrium at 25 ºC.
What is the total gas pressure at equilibrium.

A) 1.2
B) 0.9
C) 0.3
D) 0.6
E) 0.1

21 **What is the acceptable name of SF_6?**

A) Sulfate hexafluoride
B) Sulfate heptafluoride
C) Sulfate fluoride
D) Sulfur heptafluoride
E) Sulfur pentaflouride

22 **What is the formula of Sodium hypochlorite?**

A) NaClO
B) $NaClO_2$
C) $NaClO_3$
D) $NaClO_4$
E) NaC_2O

A

23 Potassium 40 is one of the naturally occurring radioactive isotopes of elements of low atomic number. Its percent natural abundance is 0.012%. How many K-40 atoms do you ingest by drinking one cup of whole milk containing 390 mg K? (K: 39 mg/mol)

A) $7.2*10^8$
B) $7.2*10^7$
C) $7.2*10^9$
D) $2*10^6$
E) $2*10^7$

24 What is the acceptable name of Cu_2O?

A) Copper (I) oxide
B) Copper monoxide
C) Copper (II) oxide
D) Copper oxide
E) Mono Copper monoxide

25 What happens to the oxidizing agent in an oxidation-reduction reaction?

A) It is oxidized as it gains electrons.
B) It is oxidized as it loses electrons.
C) It is reduced as it loses electrons.
D) It is reduced as it gains electrons.
E) It is reduced as it loses proton.

A

26 The net reaction producing electricity in this voltaic cell is

$$Zn_{(S)} + Cl_2 \longrightarrow ZnCl_{2(aq)}$$

what is E^0_{cell} of this voltaic cell?

$$Zn^{2+} + 2e^- \longrightarrow Zn_{(S)} \quad E^0 = -0.763$$
$$Cl_2 + 2e^- \longrightarrow 2Cl^- \quad E^0 = 1.360$$

A) -0.563
B) 2.123
C) -2.123
D) 0.563
E) 1.230

27 The following voltaic cell is constructed and its voltage is measured.
$Cd_{(S)} / Cd^{2+}$ (1M) // Cu^{2+} (1M) / $Cu_{(S)}$
$E^0 = 0.740$ V

What is the standard potential for Cd^{2+} / Cd electrode
$Cu^{2+} + 2e^- \longrightarrow Cu_{(S)}$ $E^0 = +0.337$ V

A) -0.066
B) -1.077
C) 1.077
D) +0.403
E) -0.403

28 The cell potential, E°, for an oxidation-reduction reaction was found to equal 1.10 V. What can be said about this reaction?

A) nonspontaneous
B) endothermic
C) spontaneous
D) at equilibrium
E) exothermic

A

29 **50 ml of 0.1M $AgNO_3$ is added to an excess of $K_2CrO_{4\,(aq)}$; What mass of Ag_2CrO_4 will precipitate from the solution? (Ag:108; Cr: 52: O:16 g/mol)**

A) 1.66
B) 0.62
C) 0.83
D) 2.49
E) 0.31

30 **One reaction by which $POCl_3$ can be prepared is**

$$6PCl_{3\,(l)} + 6Cl_{2\,(g)} + P_4O_{10\,(S)} \rightarrow 10\ POCl_{3\,(l)}$$

if 412.5 g each of PCl_3, Cl_2 and P_4O_{10} are allowed to react, how many gram of $POCl_3$ will be formed? (P:31; Cl: 35.5; O:16 g/mol)

A) 767.5
B) 3070
C) 1535
D) 6405
E) None of above

A

31 **Urea is produced annually for use a fertilize. The principle reaction employed is**

$$2NH_3 + CO_2 \rightarrow CO(NH_2)_2 + H_2O$$

If 30g urea is obtained per mol CO_2 the reacts, what are the percent yield in this reaction? (N:14; O:16; H:1 g/mol)

A) 80
B) 90
C) 60
D) 70
E) 50

32 **Potassium chromate, K_2CrO_4, is used in dying textiles we want to prepare exactly 0.5 L of 0.25 M K_2CrO_4 solution in water. What mass of K_2CrO_4 should we use for this purpose? (K:39; Cr:52; O:16 g/mol)**

A) 32.33
B) 24.25
C) 12.125
D) 48.5
E) 6.06

33 **When heated with sulfuric or phosphoric acid cyclohexanol $C_6H_{12}O$ convert to cyclohexene (C_6H_{10}) additional procedure are required to purity the cyclohexene. The percent yield 50%, to use in synthesizing other organic compounds, we need 39 g of pure cyclohexene.**

What mass of cyclohexanol that is 50% is pure must we use to obtain 25g pure cyclohexene?

A) 50
B) 200
C) 25
D) 100
E) 12.5

34 **What is the condensed formula for the compound 4-t-buthyl-2 methyl heptane?**

A) $CH3CH_2CH(CH_3)CH_2CH[C(CH_3)_3]CH_2CH_3$
B) $CH_3CH(CH_3)CH_2CH[CH(CH_3)_2]CH_2CH_2CH_3$
C) $(CH_3)_2CHCH_2CH[C(CH_3)_3]CH_2CH_2CH_3$
D) $(CH_3)_2CH_2CH_2CH[CH(CH_3)_2]CH_2CH_2CH_3$
E) $CH_3CH(CH_3)CH_2CH[C(CH_3)_3]CH_2CH_2CH_3$

35 **The hybridisation state of an alkene carbon is:**

A) p
B) sp
C) s
D) sp^2
E) sp^3

36 **Identify the orbitals involved with the C-C sigma-bonding framework in ethyne.**

A) (2sp2, 2sp2)
B) (2p, 2p)
C) (2s, 1s)
D) (2sp3, 2sp3)
E) (2sp, 2sp)

37 **Pick out the molecule which has a zero dipole moment.**

A) trans-HFC=CHF
B) NCl_3
C) cis-HBrC=CFH
D) CH_2Br_2
E) fluoromethane

38 **$Ca(OH)_{2(S)}$ is soluble in water only to the extent of 0.74 g $Ca(OH)_2$/100 ml solution at 20 ºC. What are $[OH^-]$ in saturated $Ca(OH)_{2\,(aq)}$ at 20 ºC? (Ca:40, O:16, H:1 g/mol)**

A) 0.4
B) 0.2
C) 0.3
D) 0.1
E) 0.02

A

39 **$C_{17}H_{21}O_4N$ is soluble in water to the extent of 3.01g/L solution, and saturated solution has pH= 10. What is the value of K_b for $C_{17}H_{21}O_4N$? (C:12; N:14; O:16, H:1 g/mol)**

A) 2×10^{-6}
B) 1×10^{-6}
C) 2×10^{-5}
D) 1×10^{-5}
E) 1×10^{-7}

40 **0.05 M NH_3 solution has pH = 11, what is the value of K_b for NH_3?**

A) 1×10^{-5}
B) 2×10^{-5}
C) 1×10^{-6}
D) 2×10^{-6}
E) 2×10^{-7}

41 **Calculate $[OH^-]$ concentration in 100 ml of 0.01 M HCl (aq) solution.**

A) $1 \times 10^{+16}$
B) $1 \times 10^{+12}$
C) 1×10^{-16}
D) 1×10^{-12}
E) 1×10^{-2}

A

42 **Several irregularly shaped pieces of metal, weighting 30g, are dropped into a graduated cylinder containing 18 cm^3 of water. The water level rises to 21 cm^3. What is the density of the metal?**

A) 6
B) 2
C) 8
D) 4
E) 10

43 **What is the value, in liters, occupied by 60 kg of X solvent at 20 ºC? the density of X solvent at 20 ºC is 0.75 g/ml.**

A) 70
B) 60
C) 90
D) 80
E) 50

44 **Arrange the following species in order to increasing size, Ar, Cl^-, K^+, S^{2-}, Ca^{2+} (Ar:18, K:19, Cl:17, S:16, Ca:20).**

A) $Ca^{2+} < K^+ < Ar < S^{2-} < Cl^-$
B) $Ca^{2+} < K^+ < Cl^- < Ar < S^{2-}$
C) $Ca^{2+} < K^+ < Ar < Cl^- < S^{2-}$
D) $K^+ < Ca^{2+} < Cl^- < Ar < S^{2-}$
E) $K^+ < Ca^{2+} < Ar < Cl^- < S^{2-}$

A

45 What is the group of periodic table of francium? (Fr : 87)

A) 7A
B) 2A
C) 3A
D) 6A
E) 1A

46 Which of the following will INCREASE the temperature at which water boils in an open beaker?

1. A decrease in atmospheric pressure
2. Stirring the water
3. The addition of salt to the water
Decide which of the items is/are correct.

A) 2 and 3 only
B) 1 only
C) 1 and 2 only
D) 1, 2 and 3
E) 3 only

47 The lengths of mercury thread in the uniform tube above the bulb of a mercury thermometer are:

20 mm when the bulb is in melting ice.
170 mm when the bulb is in the steam above boiling water.
50 mm when the bulb is in liquid X.

What is the temperature of liquid X in ^{0}C?

A) 10
B) 30
C) 20
D) 25
E) 33

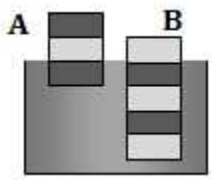
A

48 Put the following substances in order from that with lowest density to that with highest density:

1. ice
2. mercury
3. steam
4. water

A) 1-4-3-2
B) 3-1-4-2
C) 1-4-2-3
D) 3-4-1-2
E) 4-3-1-2

49



Objects A and B are in equilibrium when placed in a liquid as shown in the figure.

What is the ratio of d_A / d_B ?

A) 2/3
B) 7/3
C) 3/4
D) 5/7
E) 5/12

50 Raindrops fall with constant speed during the later stages of their descent because

A) the gravitational force is the same for all drops.
B) air resistance just balances the force of gravity.
C) the force of gravity is negligible for objects as small as raindrops.
D) the drops all fall from about the same height.
E) the forces on the raindrops are unbalaced.

51 Which of the following cases is / are <u>NOT</u> a uniformly accelerated motion?

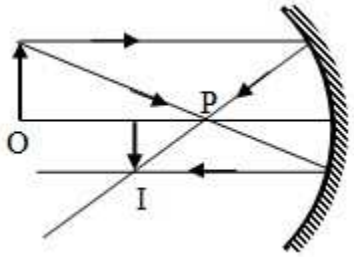
I. A feather falls from a certain height inside a vacuum tube.
II. A ball rolls along a frictionless horizontal plane.
III. A coin falls from a certain height in air but air resistance is negligible.

A) I and III
B) Only II
C) II and III
D) Only I
E) I and II

52 Sphere *P* is positively charged and sphere *Q* is uncharged. If the two spheres are brought into contact, which of the following statements is correct?

A) Electrons flow from *Q* to *P*; conventional current flows from *Q* to *P*.
B) Electrons flow from *Q* to *P*; conventional current flows from *P* to *Q*.
C) Electrons flow from *P* to *Q*; conventional current flows from *Q* to *P*.
D) Protons flow from *P* to *Q*; conventional current flows from *P* to *Q*.
E) Electrons flow from *P* to *Q*; conventional current flows from *P* to *Q*.

53



In the diagram above I is the image of an object O formed by a concave mirror.

Which of teh following is / are true?
1. The point P is the pole of the mirror.
2. The object is at the center of curvature of the mirror.
3. The image is real.

A) 2 and 3 only
B) 1 only
C) 1, 2 and 3
D) 1 and 2 only
E) 3 only

54 **In the Rhinns of Islay lighthouse in Scotland, there are 180 steps to the light at the top. The average height of each step is 20 cm. It takes the lighthouse keeper exactly three minutes to run up all the steps. The mass of the keeper is 74 kg.**

What is the keeper's average power? ($g=10\ m/s^2$)

A) 14.8 W
B) 14.8 kW
C) 148 W
D) 1.48 kW
E) 148 kW

55 **If there is no reaction force, which of the following cases will occur?**

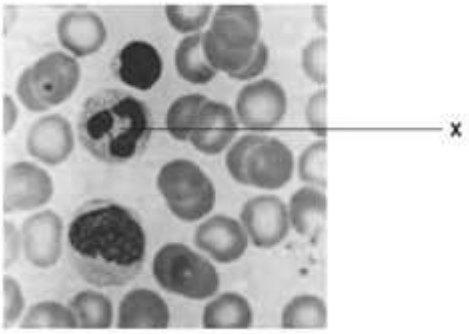
(1) We cannot swim.
(2) We cannot jump.
(3) We cannot walk.

A) (1) only
B) (2) only
C) (3) only
D) (1) and (2) only
E) (1) , (2) and (3)

56 **What is the role of thrombin in the process of blood clotting?**

A) Causes the release of thromboplastin from platelets
B) Catalyses the conversion of fibrinogen into fibrin
C) Converted into prothrombin by platelets.
D) Captures blood cells which accumulate to form a blood clot
E) Converted into fibrin by prothrombin

57



The photograph shows some blood as seen under the microscope.

What is the function of the cell labelled X?

A) Blood clotting
B) Defending against disease
C) Transporting hormones
D) Carrying oxygen
E) Pumping blood

58 **Which of the following pairs does NOT represent a correct relationship?**

A) glucose; polysaccharide
B) starch; carbohydrate
C) glucose; carbohydrate
D) starch; polysaccharide
E) glucose; monosaccharide

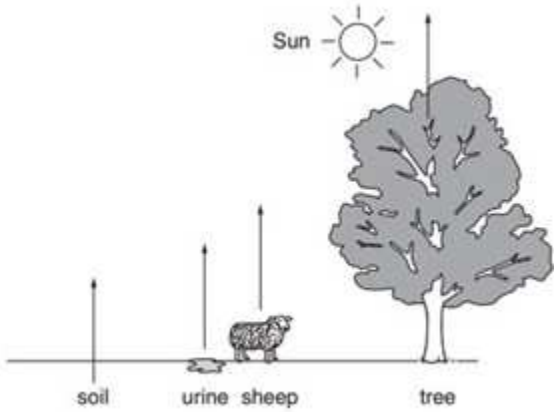
59 **Which is not a primary function of protein molecules?**

A) Energy storage
B) Transport
C) Enzymes
D) Some hormones
E) Keratin

60 Which muscles contract to cause air to pass into the lungs through the trachea?

A) Only internal intercostal muscles
B) Internal intercostal muscles and diaphragm
C) External intercostal muscles and diaphragm
D) External intercostal muscles and internal intercostal muscles
E) Only diaphragm

61



The diagram shows the release of a gas into the atmosphere from different sources.

What is this gas?

A) hydrogen
B) oxygen
C) carbon dioxide
D) nitrogen
E) none of them

62 What property of enzymes is shown when their substrate concentration changes?

A) The activity of an enzyme increases constantly with an increase in substrate concentration
B) Enzyme activity increases to an optimum substrate concentration and then decreases
C) Enzyme activity decreases with increased substrate concentration
D) Enzyme activity increases with increased substrate concentration until all the active sites are occupied.
E) There is no enzyme activity

63 A cell with a diploid number of 12 chromosomes undergoes meiosis. What will be the product at the end of meiosis?

A) 2 cells each with 6 chromosomes
B) 4 cells each with 6 chromosomes
C) 2 cells each with 12 chromosomes
D) 4 cells each with 12 chromosomes
E) 4 cells each with 3 chromosomes

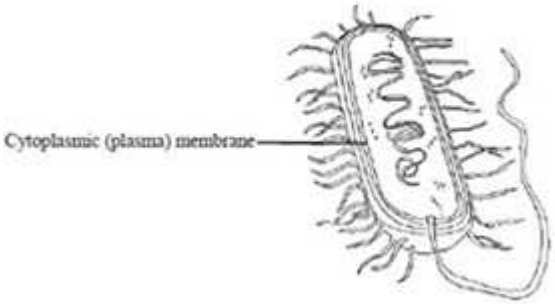
64 How does the amniotic fluid help the fetus during pregnancy?

I. Supplies food to allow the fetus to grow rapidly
II. Supports the fetus so that no part of it is under excess pressure
III. Protects the fetus by acting as a shock absorber

A) I and III only
B) I, II and III
C) I and II only
D) II and III only
E) II only

A

65



What is the function of the cytoplasmic (plasma) membrane of this bacterium?

A) To control entry and exit of substances
B) To produce ADP
C) To synthesize proteins
D) To form the only protective layer preventing damage from outside
E) None of them

TEST BİTTİ
CEVAPLARINIZI KONTROL EDİNİZ