PAST PAPERS بجن

CHEMISTRY

1) A 1.728 in^3 of a substance has a mass of 36 grams, what is the density of the substance in g/cm^3 ? (1inch =2.54cm)

a) 21

b) 5.6

c) 30

d) 14

e) 1.3

2)what is the atomic weight of an element consisting of two isotopes, one with mass=64.23 amu,relative abundance =0.260, and one with mass=65.32 amu ?

a) 65.3 amu

b) 64.4 amu

c) 64.9 amu

d) 65.0 amu

e) 64.8 amu

3) When 250.ml of a 0.15 M solution of $(NH_4)_2S$ is added into 120.ml of a 0.053M solution of $CdSO_4$ how many grams of CdS are formed? (molar mass of CdS=144.5g/mol)

$$(NH_4)_2S(aq) + CdSO_4(aq) \longrightarrow CdS(s) + (NH_4)_2SO_4(aq)$$
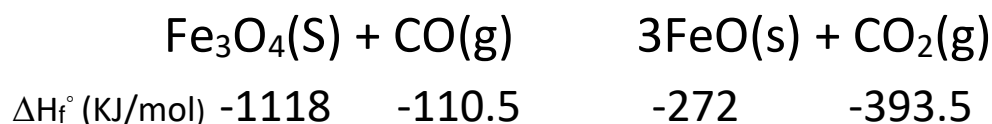
a) 5.4 g

b) 0.92 g

c) 2.6 g

d) 1.9 g

e) 530 g

4) Three 1.0-liter flasks are filled with H_2, O_2 and Ne, respectively at STP, wich of the following statements is true ?

a) each flask has the same number of gass molecules.

b) the velocity of the gas molecules is the same in each flask.

c) the density of all gases is the same.

d) there are twice as many Ne atoms than O_2 and H_2 .

e) None of the above is true .

5) Calculate ΔH for the following reaction at 25.0 C$\circ$:

$$Fe_3O_4(S) + CO(g) \quad\quad 3FeO(s) + CO_2(g)$$

$\Delta H_f°$ (KJ/mol) -1118   -110.5   -272   -393.5

a) -263 KJ

b) 54 KJ

c) 109 KJ

d) -50 KJ

e) 19 KJ

6) a 0.156 mol of methanol, CH_3OH_2 was combusted in the presence of excess oxygen in a bomb calorimeter .If the temperature of the calorimeter increased from 24.00 $\circ$C to 29.77 $\circ$C and the heat capacity of the calorimeter and its contents was 19400. J/$\circ$C , calculate ΔU for the reaction in KJ/mol .

a) -314 KJ/mol

b) -789 KJ/mol

c) -718 KJ/mol

d) -121 KJ/mol

e) -69.5 KJ/mol

7) Which statement about the four quantum numbers which describe electrons in atoms is wrong?

a) n = principal quantum number, n = 1, 2, 3, ...

b) l = angular momentum quantum number, l = 1, 2, 3,...,(n+1)

c) m_l = magnetic quantum number, m_l = (-1),...,(0),...,(+1)

d) m_s = spin quantum number, m_s = +1/2 or -1/2

e) the magnetic quantum number is related to the orientation of atomic orbitals in space.

8) In the lewis structure of $XeBr_4$ molecule, the number of lone pairs of electrons around the central Xe atom is:

a) 0

b) 1

c) 2

d) 3

e) 4

9) Which one of the following does not .... The octet rule?

a)

b) CBr_2

c) NF_3

d) OF_2

e) AsF_3

10) which of the following ions has the largest ionic radius?

a) Cl^-

b) Ca^{+2}

c) P^{-2}

d) K^+

e) S^{-2}

11) Which of the following four molecules is (are) polar .PH_3 , OF_2 , HF , BCl_2 ?

a) all except BCl_2

b) only HF

c) only HF and OF_2

d) None of them

e) all of them

12) Which of the following represents the number of π bonds and σ bonds in the ten Lewis structure of H_2SO_4 ?

a) 6σ and 2π

b) 4σ and 2π

c) 4σ and 4π

d)6σ and 1π

e) 5σ and 2π

13) A car is moving with a velocity of 65km/hr , how many miles would it travel in 35 sec .(1 mile = 1.61 km)

a) 0.39

b) 1.1

c) 2.5

d) 0.18

e) 0.56

14) Naturally occurring rubidium consists of two isotopes, 84.912 amu and 86.901 amu ,what is the average atomic weight (amu) of rubidium If the fractional abundance of the heavier isotope is 0.28007

a) 85.907

b) 85.469

c) 86.021

d) 85.005

e) 86.153

15) If a sample of N_2O_3 decomposes to produce 1.381 g O_2 how many grams of NO_2 are formed ? (molar mass of NO_2 = 46.01 g/mol , O_2 = 32.00 g/mol).

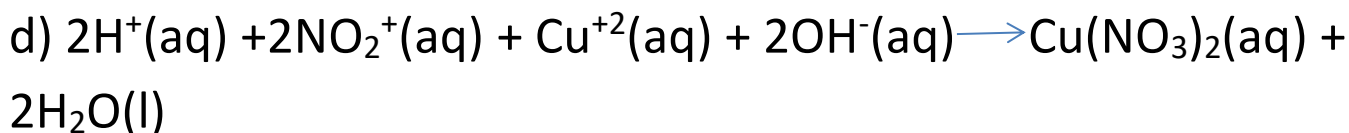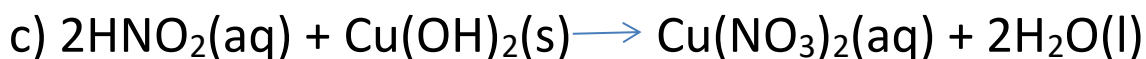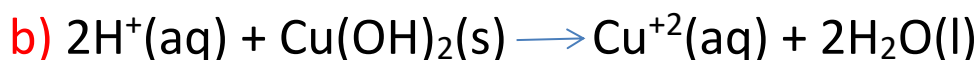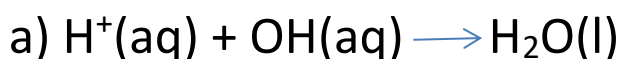$2N_2O_3 \longrightarrow 4NO_2(g) + O_2(g)$

a) 4.625

b) 3.967

c) 5.520

d) 7.942

e) 1.438

16) What is the net ionic equation for the reaction that occurs when nitric acid is added to copper(II) hydroxide ?

$2HNO_2(aq) + Cu(OH)_2(s) \longrightarrow Cu(NO_3)_2(aq) + 2H_2O(l)$

a) $H^+(aq) + OH(aq) \longrightarrow H_2O(l)$

b) $2H^+(aq) + Cu(OH)_2(s) \longrightarrow Cu^{+2}(aq) + 2H_2O(l)$

c) $2HNO_2(aq) + Cu(OH)_2(s) \longrightarrow Cu(NO_3)_2(aq) + 2H_2O(l)$

d) $2H^+(aq) + 2NO_2^+(aq) + Cu^{+2}(aq) + 2OH^-(aq) \longrightarrow Cu(NO_3)_2(aq) + 2H_2O(l)$

e) $2H^+(aq) + 2NO_2^+(aq) + Cu^{+2}(aq) + 2OH^-(aq) \longrightarrow Cu^{+2}(aq) + 2H_2O(l) + 2NO_3$
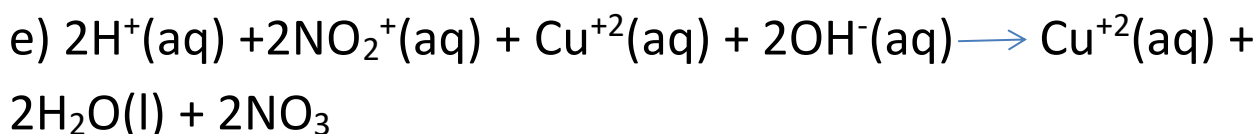
17) If 0.0870 g of gas occupies 33.6 ml at STP, calculate the molecular mass of the gas (R = 0.0821 L.atm/K.mol, PV = nRT)

a) 29.0
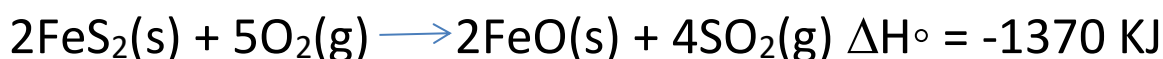
b) 41.2

c) 58.0

d) 66.4

e) 87.0

18) calculate the standard heat of formation, ΔHf ,for $FeS_2(s)$, given the following information:

$2FeS_2(s) + 5O_2(g) \longrightarrow 2FeO(s) + 4SO_2(g)$ $\Delta H° = -1370$ KJ

ΔHf for $SO_2(g) = -297$ KJ/mol ΔHf for $FeO(s) = -268$ KJ/mol

a) -177 KJ

b) -1550 KJ

c) -774 KJ

d) -686 KJ

e) +808 KJ

19) Calculate the change in the internal energy (ΔU) for the reaction of Ni with CO, If 158 KJ heat was evolved and 5.65 KJ work was done on the system .

$Ni(s) + 4CO(g) \longrightarrow Ni(CO)_4(g)$
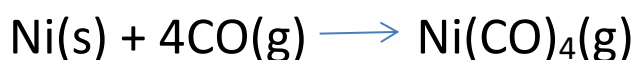
a) -158 KJ

b) 149 KJ

c) 167 KJ

d) -167 KJ

e) -149 KJ

20) State which of the following sets of quantum numbers would be impossible .

a) *n=1, l=0, ml=0, ms=+1/2*

b) *n=2, l=2, ml=+2, ms=+1/2*

c) *n=3, l=2, ml=+2, ms=-1/2*

d) *n=2, l=1, ml=0, ms=-1/2*

e) *n=2, l=1, ml=-1, ms=-1/2*

21) Which element has the highest first ionization energy ?
a) Be
b) B
c) C
d) N
e) O

22) The atom having the valence shell configuration $4s^2 4p^1$
would be in .
a) group 6A and period 5
b) group 4B and period 4
c) group 6B and period 7
d) group 7A and period 4
e) group 7B and period 4

23) Estimate the heat of reaction (ΔH) at 298 K for the reaction
shown, given the average bond energies below.

$Br_2(g) + 3F_2 \longrightarrow 2BrF_3(g)$
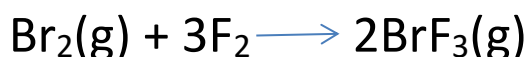
[The bond energies of Br-Br = 192 KJ/mol, F-F = 158 KJ/mol,

 Br-F = 197 KJ/mol]

a) -516 KJ

b) -410 KJ

c) -611 KJ

d) -665 KJ

e) -720 KJ

24) Which one of the following violates the octet rule?

a) PCl_3

b) CBr_4

c) NF_3

d) OF_3

e) PCl_5

25) The correct lewis structure for nitrogen trichloride has:

a) 3 N-Cl bonds and a total of 10 lone pairs of electron.

b) 3 N=Cl bonds and a total of 6 lone pairs of electrons.

c) 1 N-Cl bond, 2N=Cl bonds and 7 and a total of lone pairs of electrons.

d) 2N-Cl bonds, 1N=Cl bond and a total of 8 lone pairs of electrons.

e) 3N-Cl bonds and a total of 9 lone pairs of electrons.

26) Consider hydrogen carbonate ion (HCO_3). After drawing the correct lewis structure(s) you would see.
a) two double bonds around the central carbon atom.

b) three single bonds around the central carbon atom.

c) four single bonds around the central carbon atom.

e) three equivalent resonance forms.

27) Which of these isoelectronic species has the smallest radius ?

a) Br$^-$

b) Sr^{+2}

c) Rb$^+$

d) Se^{-2}

e) they are all the same radius because they have the same number of electrons.

28) A natural molecule having the general formula AB, has one lone pairs of electrons on A. what is the hybridization of A.

a) sp

b) sp^2

c) sp^3

d) sp^{3}d

e) sp^{3}d^2

29) Which of the following four molecules are polar. PH_3, OF_2, HF, SO_3?

a) all except SO_3

b) only HF

c) only HF and OF_2

d) none of them

e) all of them

30) The perechloric acid ($HClO_4$) molecule contains:

a) 13 lone pairs 1 π bond, and 4 σ bonds.

b) 9 lone pairs. No π bonds, and 6 σ bonds.

c) 8 lone pairs.3 π bonds, and 5 σ bonds.

d) 2 lone pairs. 3 π bonds, and 4 σ bonds

e) 11 lone pairs. No π bonds, and 5 σ bonds

31) The density of a liquid is 2.65 g/cm^3. Calculate the mass of 0.25 m^3 of this liquid.(in Kg).

a) 7.1×10^2

b) 9.5×10^3

c) 5.0×10^2

d) 6.6×10^2

e) 8.2×10^2

32) The correct name for P_2O_3?

a) phosphorus(V) oxide.

b) phosphorus pentoxide.

c) diphosphorus pentoxide.

d) phsphorus oxide.

e) phosphoric oxide.

33) The mass of one molecule of a compound is 2.03x10^{-22}g, calculate the molar mass of the compound (in g/mol), (Avogadro`s number = 6.02x10^{23}).

a) 122
b) 158
c) 192
d) 146
e) 134

34) Which of the following pairs of aqueous solutions would not produce a reaction when mixed?
a) $NaNO_3$ and $CuCl_2$
b) $NaSO_4$ and $Ba(OH)_2$
c) $Ba(OH)_2$ and HCl
d) $CuCl_2$ and Na_3PO_4
e) $AgNO_3$ and HCl

35) the molar mass of an unknown gas was measured by an effusion experiment. It was found that it took 60 s for a given volume of the gas to effuse, whereasthe same volume of nitrogen gas required 48 s to effuse under the same condition α l/√M). the molar mass (in g/mol) of the gas is?
a) 25

b) 35

c) 18

d) 31

e) 44

36) Consider the reaction: $C_2H_3OH(l) + 3O_2(g)$

$3H_2O(g) + 2CO_2(g)$, $\Delta H = 1236$ KJ , then ΔU(internal energy change) for the reaction (in KJ/mol) is:

a) -1231

b) -1237

c) -1251

d) -1241

e) -1246

37) When 0.0500 mol of HCL(aq) in a offee cup calorimeter, the temperature of the solution increases by 5.99∘C. What is the enthalpy change for the following reaction (in KJ)?

$\qquad$ HCL(aq) + NaOH(aq) $\qquad$ NaCl(aq) + $H_2O(l)$

Assume that the heat capacity of the calorimeter and is 465.4 J/∘C.

a) -55.8

b) -38.6

c) 38.6

d) -0.139

e) 55.8

38) All the following statements about the quantum numbers are true axcept:

a) m_l has 21 + l possible values

b) n may take values from 1 to ∞.

c) m_l may take only the values of +1 to -1 , including zero.

d) l may take integral values from 1 to n-1.

e) m_l may take only the values of + 1/2 and -1/2

39) The ground state electrone configuration of manganese atom ($_{25}$Mn) has ____ unpaired electrons and is _____?

a) 5, paramagnetic

b) 0, diamagnetic

c) 2, paramagnetic

d) 3,paramagnetic

e) 5,diamagnetic
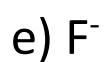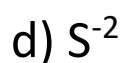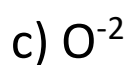
40) Which of the following elemnts has the largest second ionization energy?

a) Si

b) Cl

c) Na

d) S

e) Mg

41. The ground state electron configuration of $_{29}$Cu atom is?

a) $[Ar]4s^13d^{10}$

b) $[Ar]4s^14d^9$

c) $[Kr]4s^13d^{10}$

d) $[Kr]4s^23d^9$

e) $[Ar]4s^23d^9$
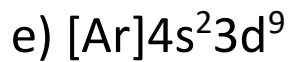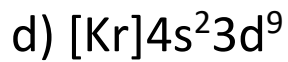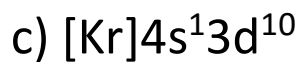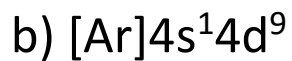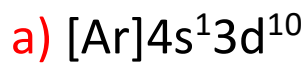
42. which of the following isoelectronic ions has the smallest radius:

a) Ca^{+2}

b) Mg^{+2}

c) O^{-2}

d) S^{-2}

e) F^-

43) which of the following compounds would be expected to have the highest melting point?

a) NCl_3

b) OCl_2

c) $MgCl_2$

d) $LiCl$

e) CCl_4
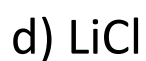
44) Which of these species have two resonance structure?

a)CH_4

b) CH_3O

c) H_2O

d) NO_2Cl

e) H_2S

45) The formal charge on N in the Lewis structure of NO_2^- is:

a) +2

b) +1

c) 0

d) -1

e) -2

46) Which the following compounds does the octet rule?

a) $SiCl_4$

b)$XeCl_4$

c) PH_3

d) H_2S

e) NO_3^-

47) What is the molecular geometry (shape) of BrF_4^-?

a) T-shaped

b) tetrahedral

c) square planar

d) trigonal pyramidal

e) seesaw

48) The hybridization of the central atom P, in PCl_3 is:

a) sp^3

b) sp^2

c) sp

d) sp^3d^2

e) sp^3d

49) According to valence-bond theory , thebonding in ketene ,H_2CCO, is best described as

a) five π bonds

b) three σ bonds and two π bonds

c) four σ bonds and two π bonds

d) four σ bonds and one π bond

e) five σ bonds

50) What is the volume of a 2.50 g block of metal whose density is 6.72 g/cm^3?

a) $16.8cm^3$

b) $2.69cm^3$

c) $0.095cm^3$

d) $0.372cm^3$

e) $1.60cm^3$

51) Which is the correct name of $HClO_2$

a) hypochlorous

b)chloric acid

c) chlorous acid

d) hydrochloric

e) perchloric

52) If 2.00 moles of SiO_2 and 4.00 moles of C reacted according to the equation below, calculate the theoretical yield of CO produced (molar mass of O= 28.0g/mol). $SiO_2+3C \quad SiC+2CO$

a) 112g

b) 18.7g

c) 56.0g

d) 74.7g

e) 14.0 g

53) Given the following net ionic equation, which of the following statements is wrong?

$$2H^+(aq) + Cu(OH)_2(s) \longrightarrow Cu^{+2}(aq) + 2H_2O(l)$$
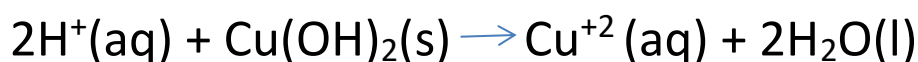
a) This is a redox (oxidation –reducation) reaction

b) The acid involved is a strong electrolyte

c) The base, Cu (OH)$_2$, is an insoluble

d) This is a neutralization reaction

e) This could be the net ionic equation for HNO_3 reacting with $Cu(OH)_2$.

54) KHCO$_3$ decoposes according to the equation below. If 0.33 mol of KHCO$_3$ decomposed at a temperrature of 793∘k and 1.16 atm, calculate the total volume of the gases produced.
   (R=0.0821 atm.L/mol.K).

$$2k_2CO_3 (s) \longrightarrow K_2CO_3(s) + CO_2(g) + H_2O(g)$$
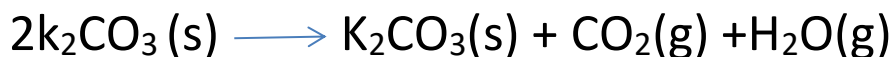
a) 56L

b) 19L

c) 10L

d) 37L

e) 12L

55) Calculate $\Delta H°_{rxn}$ for the following reaction at 25.0C∘

$$Fe_3O_4(s) + CO(g) \longrightarrow 3Feo(s) + CO_2(g)$$

$\Delta H_f°$ (KJ/mol) -1118   -110.5   -272   -393.5

a) -263 KJ

b) 54 KJ

c) 19 KJ

d) -50 KJ

e) 109 KJ

56) When 0.180 mole of sodium nitrate, NaNO$_3$, was dissolved in water in a constant-pressure calorimeter is 1071 J/C∘ what is the enthalpy change when I mol of sodium nitrate dissolves in water?

a) -20.5 KJ/mol

b) -151 KJ/mol

c) 20.5 KJ/mol

d) 151 KJ/mol

e) -98.6 KJ/mol

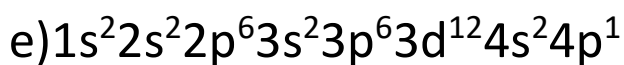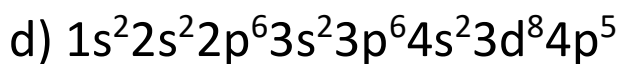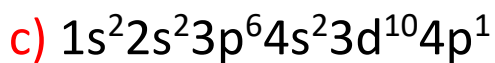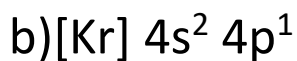57) The maximum number of electron that can be accommodated in a sublevel for which $l=3$ is :

a) 2

b) 14

c) 6

d) 18

e) 10

58) The valence shell electron configuration ns2np^3 corresponds to which one of the following elements in its ground state?

a) S

b) Ca

c) Cr

d) Br

e) P

59) The ground state electron configuration for arsenic $_{33}$As is :

a) [Ar] $4s^2$ $4p^{13}$

b)[Kr] $4s^2 4p^1$

c) $1s^2 2s^2 3p^6 4s^2 3d^{10} 4p^1$

d) $1s^2 2s^2 2p^6 3s^2 3p^6 4s^2 3d^8 4p^5$

e)$1s^2 2s^2 2p^6 3s^2 3p^6 3d^{12} 4s^2 4p^1$

60) Which element has the largest atomic radius?

a) Li

b) Rb

c) Na

d) Br

e) I

61) Which of the following does not have a nobel gas eletron configuration?

a) S^{-2}

b) Cu^+

c) Al^{+3}

d) Sb^{-3}

e) Sc^{+3}

62) The formal charge of N in NO^-_3 ion is

a) +1

b) +2

c) 0

d) -1

e) -2

63) Which of the following does not obey the octet rule?

a) O_3

b) CBr_4

c) KF

d) Al_2O_3

e) $SbCl_5$

64) What is the total number of valence electrons in Lewis dot formula of the sulfite ion SO_3^{2}?

a) 8

b) 24

c) 26

d) 30

e) 32

65) Which of the following has two resonance structures?

a) CCl_4

b) CH_2O

c) H_2O

d) H_2O

e) NO_2Br

66) A triple bond contains ---- sigma bond(s) and ---- pi bond(s):

a) 0,3

b) 3,0

c) 2,1

d) 1,2

e) 3,2

67) The F-S-F bond angles in SF_6 are:

a) 109.5°

b) 120° only

c) 90° and 120°

d) 45° and 90°

e)90° and 180°

68) Which molecule is nonpolar?
a) H_2Se
b) BeH_2

c) PF_3
d) $CHCl_3$

e) SO_2

69) What hybrization is predicated for sulfur in the SCl_2?
a) sp
b) sp^2

c) sp^3
d) sp^{3}d
e) sp^{3}d^2