# *Sample 112 Final*

1. A transition metal, a halogen, and a metalloid in that order are

   a) Ni, N, Sn
   b) Sc, Si, Sb
   c) Cr, Cl, As
   d) As, Cl, Se
   e) Ca, Cl, Se

2. How many grams of $CH_4$ contain the same number of molecules as 2.50 grams $O_2$?

   a) 1.25 g
   b) 0.0781 g
   c) 0.156 g
   d) $4.70 \times 10^{22}$ g
   e) $4.88 \times 10^{-3}$ g

3. The formula of the compound ammonium phosphate is

   a) $NH_4(PO_4)_3$
   b) $NH_4(PO_4)_2$
   c) $(NH_4)_2PO_4$
   d) $(NH_4)_3PO_4$
   e) $(NH_4)_3(PO_4)_2$

4. Which combination of name and formula is correct?

   a) aluminum phosphate, $Al_2(PO_4)_3$
   b) ammonium sulfate, $NH_4SO_4$
   c) iron(III) chloride, $Fe_2Cl_3$
   d) carbon tetrachloride, $CCl_4$
   e) magnesium nitrite, $Mg(NO_3)_2$

5. For a substance to be considered a strong electrolyte, it must
   a) be an ionic compound
   b) dissociate virtually completely to its ions in solution
   c) be highly soluble in water
   d) contain both metal and nonmetal atoms

6. A precipitate will form when an aqueous solution of lead(II) nitrate is added to an aqueous solution of

   a) $NH_4NO_3$
   b) $Mg(NO_3)_2$
   c) $NaNO_3$
   d) $KNO_3$
   e) NaCl

7. Consider the equation: $2\ NaI(aq) + Cl_2(g) \rightarrow I_2\ (aq) + 2\ NaCl(aq)$
The element undergoing reduction is

a) sodium
b) iodide
c) chlorine
d) iodine
e) water

8. The driving force for the reaction of zinc metal with a solution of lead(II) nitrate is

a) the formation of a precipitate
b) the formation of a gas
c) the evolution of a gas
d) the dissolving of a solid
e) the transfer of electrons

9. If 150.0 g $SiO_2$ and 60.0 grams C are allowed to react according to the equation below, what is the maximum amount of CO that can be produced? Answer in grams.

$SiO_{2(s)} + 3\ C_{(s)} \rightarrow SiC_{(s)} + 2\ CO_{(g)}$

a) 93.4 g
b) 70.0 g
c) 140. g
d) 210. g
e) 245 g

10. What volume of 0.150 M NaOH is needed to react completely with 3.45 g iodine according to the equation
$3\ I_2 + 6\ NaOH \rightarrow 5\ NaI + NaIO_3 + 3\ H_2O$

a) 181 mL
b) 45.3 mL
c) 1.02 mL
d) 2.04 mL
e) 4.08 mL

11. When 10.0 grams of mercury(II) oxide was decomposed, a student obtained 5.00 grams of mercury. What was the per cent yield?

$2\ HgO(s) \rightarrow 2\ Hg(l) + O_2(g)$

a) 46.0%
b) 50.0%
c) 54.0%
d) 33.3%
e) 10.0%

12. To what volume must 150 mL of a 3.60 M solution be diluted to prepare a solution which is 2.40 M?

a) 1296 mL
b) 1000 mL
c) 444 mL
d) 285 mL
e) 225 mL

13. If you need 50.0 mL of a 0.250 M $KMnO_4$ solution which method do you use to prepare it?

a) Dissolve 39.5 g $KMnO_4$ in enough water to make 50.0 mL solution.
b) Dissolve 12.5 g $KMnO_4$ in enough water to make 50.0 mL solution.
c) Dissolve 1.98 g $KMnO_4$ in enough water to make 50.0 mL solution.
d) Dilute 20.0 mL of 0.500 M $KMnO_4$ to 50.0 mL.
e) Dilute 2.50 mL of 1.00 M $KMnO_4$ to 50.0 mL.

14. Equal masses of two substances, A and B, each absorb 25 Joules of energy. If the temperature of A increases by 4 degrees and the temperature of B increases by 8 degrees, one can say that

a) the specific heat of A is double that of B.
b) the specific heat of B is double that of A.
c) the specific heat of B is negative.
d) the specific heat of A is negative.
e) the specific heat of B is triple that of A.

15. When two solutions are mixed, the container "feels hot." Thus,

a) the reaction is endothermic.
b) the reaction is exothermic.
c) the energy of the universe is increased.
d) the energy of both the system and the surroundings is decreased.
e) the energy of the system is increased.

16. Consider the thermal energy transfer during a chemical process. When heat is transferred to the system, the process is said to be __?__ and the sign of q is __?__.

a) exothermic, positive
b) exothermic, negative
c) endothermic, positive
d) endothermic, negative
e) enthalpic, negative

17. The value of $\Delta H^o$ for the following reaction is −6535 kJ. How many kJ of heat will be evolved during the combustion of 16.0 g of $C_6H_6$ (l)?

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

a) $1.34 \times 10^3$
b) $5.23 \times 10^4$
c) 670
d) $2.68 \times 10^3$

18. What type of orbital is designated n = 4, l = 3, $m_l = -1$?
a) 3p
b) 3d
c) 4p
d) 4d
e) 4f

19. Which one of the following atoms has the largest atomic radius?

a) Al
b) Ge
c) Ga
d) Si
e) P

20. Which of the following is the correct electron configuration for the chromium(III) ion?

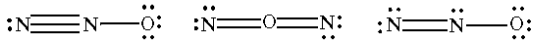
a) $[Ar]4s^2 3d^4$
b) $[Ar]4s^0 3d^3$
c) $[Ar]4s^2 3d^2$
d) $[Ar]4s^2 3d^6$
e) $[Ar]4s^0 3d^1$

21. Which one of the following elements has the largst second largest ionization energy?
a) K
b) Rb
c) Sr
d) Ca

22. Which of the following groups of elements is arranged in order of increasing electronegativity?

a) Si < Al < Br < Cl
b) Na < K < Ca < Ba
c) P < S < O < F
d) K < Rb < Cs <F
f) N < P < S < Cl

23. Dinitrogen oxide, $N_2O$, is also called nitrous oxide or "laughing gas" and is sometimes used as an anesthetic. Circle the correct Lewis structures below. Explain what is wrong with the other two structures.



#1 #2 #3

24. Which compound contains a carbon-oxygen bond with an order of 2?

a) $CO_2$
b) $CH_3OH$
c) $CH_3–O–CH_3$
d) CO
e) $C_2H_5OH$

25. How many of the following molecules have a dipole moment?

$NO_2$ $SF_6$ $PCl_5$ $CHCl_3$

a) four
b) three
c) two
d) one
e) none of these molecules has a dipole

26. Which of the following elements is most likely to form compounds involving an expanded valence shell of electrons?

a) Li
b) N
c) F
d) Ne
e) S

27. Which of the following groups contains *no* ionic compounds?

a) $H_2O$, MgO, $NO_2$
b) $CO_2$, $SO_2$, $H_2S$
c) $CCl_4$, $CaCl_2$, HCl
d) $Na_2S$, $SO_2$, $CS_2$
e) $Mg_3N_2$, $NCl_3$, HOCl

28. What is the approximate H-C-C bond angle in $H_2C{=}CH_2$?

a) 180º
b) 120º
c) 109.5º
d) 90º
e) 60º

29. What is the hybridization of the sulfur atom in $SO_3$?

a) $sp^2$
b) $sp^3$
c) $sp^4$
d) $sp^3d$
e) $sp^3d^2$

30. What pressure (in atmospheres) is exerted by 82.5 grams of $CH_4$ in a 75.0 liter container at 35.0 ºC?

a) 0.197 atm
b) 0.339 atm
c) 1.73 atm
d) 2.57 atm
e) 27.8 atm

31. 2.0 L of $H_2$ gas at 3.5 atm pressure and 1.5 L of $N_2$ gas at 2.6 atm pressure are combined at a constant temperature of 25 ºC into a 7.0 L flask. What is the total pressure in the 7.0 L flask?

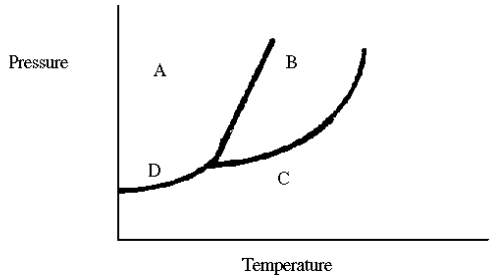
a) 0.56 atm
b) 2.8 atm
c) 1.0 atm
d) 1.6 atm

32. Non-ideal behavior for a gas is most likely to be observed under conditions of

a) standard temperature and pressure
b) low temperature and high pressure
c) low temperature and low pressure
d) high temperature and high pressure
e) high temperature and low pressure

33. Using the phase diagram for Substance Z, what changes would be observed it the conditions are changes from A to B to C to D in that order?

a) melting, vaporization, deposition
b) vaporization, freezing, sublimation
c) sublimation, freezing, melting
d) freezing, sublimation, vaporization




34. When water molecules in the liquid state enter the gaseous state we can say that

a) the *inter*molecular forces have weakened.
b) the *intra*molecular forces have weakened.
c) the intermolecular forces have strengthened
d) the intramolecular forces have strengthened.
e) both the inter and intramolecular forces have weakened.

35. The intermolecular forces(s) responsible for $CH_4$'s having the lowest boiling point in the set $CH_4$, $SiH_4$, $GeH_4$, $SnS_4$ is/are
a) hydrogen bonding
b) dipole-dipole interactions
c) London-dispersion forces
d) mainly hydrogen bonding but also dipole-dipole interactions
e) mainly London-dispersion forces but also dipole-dipole interactions

36. Chromium crystallizes in a body-centered cubic unit cell. In a bulk sample of chromium each atom is surrounded by how many "nearest neighbors"?

a) 2
b) 4
c) 6
d) 8
e) 12

37. A 1.26 M $Cu(NO_3)_2$ solution has a density of 1.19 g/cm$^3$. What is the molality of the solution?

a) 1.06 *m*
b) 1.32 *m*
c) 6.34 *m*
d) 6.72 *m*
e) 8.44 *m*

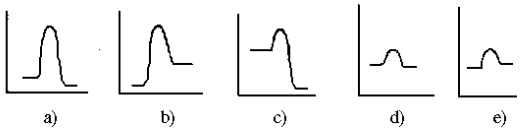
38. The amount of solvent (grams or moles) is known for each of the following solution concentrations EXCEPT

a) molarity
b) molality
c) mass %
d) $\chi$
e) II

39. Which of the following would have the lowest freezing point?

a) pure $H_2O$
b) 1 *m* urea ($CON_2H_4$)
c) 1 *m* KCl
d) 1 *m* $NaNO_3$
e) 1 *m* $Na_2SO_4$

40. A reaction has an activation energy of 40 kJ and an overall energy change of -100 kJ. What is the potential energy diagram which best describes this reaction?




41. The decomposition of phosphine, $PH_3$, follows first-order kinetics:

$4\ PH_3\ (g) \rightarrow P_4\ (g) + 6\ H_2\ (g)$

The half-life for the reaction at 550 ºC is 81.3 seconds. How long does it take for the reaction to be 75.8 % complete?

a) 8.52 seconds
b) 28.4 seconds
c) 63.8 seconds
d) 117 seconds
e) 180 seconds

42. A reaction was found to be second order in carbon monoxide concentration. What happens to the rate of the reaction if the concentration of carbon monoxide is doubled with everything else held constant?

a) it doubles
b) it remains unchanged
c) it triples
d) it increases by a factor of 4

43, Kinetic data for the following reaction was determined experimentally:

$4\ NO_2\ (g) + O_2\ (g) \rightarrow 2\ N_2O_5\ (g)$

| Experiment Number | Initial Concentration $[NO_2]_0$ (mol/L) | Initial Concentration $[O_2]_0$ (mol/L) | Initial rate of reaction (mol/L) |
|---|---|---|---|
| 1 | 0.40 | 0.10 | 3.3 |
| 2 | 0.20 | 0.10 | 1.7 |
| 3 | 0.20 | 0.50 | 41. |

What is the rate law for the reaction?

a) rate = $k\ [NO_2]^4[O_2]^1$
b) rate = $k\ [NO_2]^{1/2}[O_2]^2$
c) rate = $k\ [NO_2]^2[O_2]^2$
d) rate = $k\ [NO_2]^1[O_2]^1$
e) rate = $k\ [NO_2]^1[O_2]^2$

44. In general, as the temperature increases, the rate of a chemical reaction

a) increases due to an increased activation energy.
b) increases only for an endothermic reaction.
c) increases due to a greater number of effective collisions.
d) increases because bonds are weakened.
e) is not changed.

45. In basic solution, $(CH_3)_3CCl$ reacts according to the equation

$(CH_3)_3CCl + OH^- \rightarrow (CH_3)_3COH + Cl^-$

The accepted mechanism for the reaction is

$(CH_3)_3CCl \rightarrow (CH_3)_3C^+ + Cl^-$ (slow)
$(CH_3)_3C^+ + OH^- \rightarrow (CH_3)_3COH$ (fast)

What is the rate law expression for the reaction?

a) rate = $k\ [(CH_3)_3C^+]^2,[OH^-]$
b) rate = $k\ [(CH_3)_3C^+][OH^-]^2$
c) rate = $k\ [Cl^-]$
d) rate = $k\ [(CH_3)_3CCl]$
e) rate = $k\ [(CH_3)_3CCl][OH^-]$

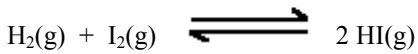
46. At equilibrium
a) All chemical processes have ceased.
b) The rate of the forward reaction equals that of the reverse.
c) The rate constant for the forward reaction equals that of the reverse.
d) Both the rate of the forward reaction equals that of the reverse and the rate constant for the forward reaction equals that of the reverse.
e) None of the above.

47. A 1.00 liter flask contained 0.24 mol $NO_2$ at 700 K. which decomposed according to the following equation. When equilibrium was achieved, 0.14 mol NO was present. Calculate $K_c$.

$$2\ NO_2(g) \rightleftharpoons 2\ NO(g) + O_2(g)$$

a) 0.098
b) 0.14
c) $1.1 \times 10^{-2}$
d) $5.7 \times 10^{3}$
e) $9.6 \times 10^{-3}$

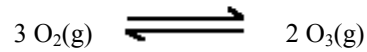
48. Under which of the following conditions does the equilibrium constant K change for the reaction



$$H_2(g) + I_2(g) \rightleftharpoons 2\ HI(g)$$

a) changing the size of the container
b) introducing more $I_2$ into the container
c) measuring the molar concentrations instead of pressures
d) changing the temperature
e) none of these, it is always constant

49. Consider an equilibrium mixture of oxygen and ozone according to the equation



$$3\ O_2(g) \rightleftharpoons 2\ O_3(g)$$

The partial pressure of $O_2$ was measured in a flask at equilibrium as 1.25 atm and the total pressure in the flask was 1.75 atm. Calculate $K_p$. Constant temperature was maintained.

a) $8.0 \times 10^{-3}$
b) 0.90
c) 0.13
d) 1.6
e) 2.7

50. Calcium carbonate decomposes when heated according to the following reaction:

$CaCO_3(s) \rightleftharpoons CaO(s) + CO_2(g)$

The mass of the $CaCO_3$ could be increased by

a) adding more $CO_2$
b) decreasing the volume of the container
c) removing some CaO
d) increasing the temperature
e) both a) and b)

51. At a specific temperature, the equilibrium constant for the following reaction is given.

$2\ NO_2\ (g) + O_2(g) \rightleftharpoons 2\ NO_3(g) \qquad K_c = 0.25$

If 1.5 mol $NO_2$, 3.0 mol $O_2$and 2.0 mol $NO_3$ are introduced into a 1.00 liter flask, what changes in concentration (if any) will be observed as the system reaches equilibrium?

a) $[NO_2]$ increases; $[O_2]$ increases; $[NO_3]$ decreases
b) $[NO_2]$ increases; $[O_2]$ decreases; $[NO_3]$ decreases
c) $[NO_2]$ decreases; $[O_2]$ decreases; $[NO_3]$ increases
d) $[NO_2]$ decreases; $[O_2]$ increases; $[NO_3]$ increases
e) all concentrations remain the same

52. The pH of a 4.52 M solution of a weak acid is 3.90 at 25 ºC. What is $K_a$ for the weak acid?
a) $1.3 \times 10^{-4}$
a) 1.8 x 10–5
b) $2.9 \times 10^{-6}$
c) 3.5 x 10–9
d) $1.5 \times 10^{-11}$

53. Which one of the acids shown in the table is the strongest?

| Acid | $K_a$ |
|---|---|
| $HCHO_2$ | $1.8 \times 10^{-4}$ |
| $CH_3CO_2H$ | $1.8 \times 10^{-5}$ |
| HClO | $3.0 \times 10^{-8}$ |
| HF | $6.8 \times 10^{-4}$ |

a) $HCHO_2$
b) $CH_3CO_2H$
c) HClO
d) HF

54. The conjugate acid of $OH^-$ is

a) $O^{2-}$
b) $H_2O$
c) $H_3O^+$
d) $H^+$
e) $O_2^-$

55. Which one of the following cannot act as a Lewis base?

a) $Cl^-$
b) $NH_3$
c) $Cr^{3+}$
d) $CN^-$

56. If you mix equal molar quantities of the following substances, how many will produce an acidic solution?

Set 1: NaOH + HCl
Set 2: NaOH + $HNO_3$
Set 3: $NH_3$ + HCl
Set 4: NaOH + $CH_3CO_2H$

a) four
b) three
c) two
d) one
e) zero (none are acidic)

57. At the neutralization point of the titration of an acid with base, what condition is met?

a) volume of base added from buret equals volume of acid in reaction flask
b) molarity of base from the buret equals molarity of acid in reaction flask
c) moles of base added from the buret equals moles of acid in reaction flask
d) % ionization of base added from the buret equals % ionization of the acid in flask.
e) all of the above conditions are met.

58. What is the concentration of $F^-$ in a saturated solution of $BaF_2$ if $K_{sp} = 1.7 \times 10^{-6}$?

a) $7.5 \times 10^{-3}$ M
b) $8.2 \times 10^{-4}$ M
c) $1.5 \times 10^{-2}$ M
d) $4.3 \times 10^{-7}$ M
e) $1.5 \times 10^{-6}$ M

59. Use the data in the following table to calculate the free energy change for the reaction at 25 ºC:
½ $N_2$ (g) + 3/2 $H_2$ (g) → $NH_3$ (g)

| Compound | $\Delta S^o$ (J/K-mol) | $\Delta H^o_f$ (kJ/mol) |
|---|---|---|
| $N_2$ (g) | 192 | 0 |
| $NH_3$ (g) | 193 | –46 |
| $H_2$ (g) | 131 | 0 |

a) –53.3 kJ
b) 29.6 kJ
c) 53.3 kJ
d) –29.6 kJ
e) –16.5 kJ

60. If a process is exothermic and not spontaneous then what must be true?

a) $\Delta S > 0$
b) $\Delta H > 0$
c) $\Delta G = 0$
d) $\Delta S < 0$
e) $\Delta H = 0$

61. Use the data in the following table to calculate the equilibrium constant for the reaction of lime with water at 298 K:

$$CaO\ (s) + H_2O\ (l) \rightarrow Ca(OH)_2\ (s)$$

| Compound | $\Delta G^\circ_f$ (kJ/mol) |
|---|---|
| CaO(s) | -604 |
| $H_2O$ (l) | -237 |
| $Ca(OH)_2$ (s) | -899 |

a) $1.50 \times 10^{10}$
b) 1.07
c) $3.03 \times 10^{-31}$
d) $1.51 \times 10^{6}$
e) $2.01 \times 10^{10}$

62. Which of the following shows the greatest increase in disorder?

a) $NH_4Br(s) \rightarrow NH_3(g) + HBr(g)$
b) $C_2H_4(g) + HBr(g) \rightarrow C_2H_5Br(g)$
c) $CO_2(s) \rightarrow CO_2\ (g)$
d) $C(s) + \frac{1}{2}\ O_2(g) \rightarrow CO(g)$
e) $C(graphite) + 2H_2(g) \rightarrow CH_4(g)$

63. Given the two half reactions and their potentials, which net reaction is *not* spontaneous?

$Zn^{2+}(aq) + 2e^- \rightarrow Zn(s)$ $\quad E^\circ = -0.763$ V
$Ni^{2+}(aq) + 2e^- \rightarrow Ni(s)$ $\quad E^\circ = -0.250$ V

a) $Ni^{2+}(aq) + Zn^{2+}\ (aq) \rightarrow Ni(s) + Zn(s)$
b) $Ni^{2+}\ (aq) + Zn(s) \rightarrow Ni(s) + Zn^{2+}\ (aq)$
c) $Ni(s) + Zn^{2+}\ (aq) \rightarrow Zn(s) + Ni^{2+}\ (aq)$
d) $Zn(s) + Ni(s) \rightarrow Ni^{2+}\ (aq) + Zn^{2+}\ (aq)$
e) $Zn(s) + Zn^{2+}\ (aq) \rightarrow Ni^{2+}\ (aq) + Ni(s)$

64. Balance the following redox equation which occurs in acidic solution:

$Cu\ (s) + NO_3^-\ (aq) \rightarrow Cu^{2+}\ (aq) + NO\ (g)$

a) $4\ H^+ + NO_3^- + Cu\ (s) \rightarrow Cu^{2+} + NO + 2\ H_2O$
b) $2\ H_2O + NO_3^- + Cu(s) \rightarrow NO + Cu^{2+} + 4\ H^+$
c) $2\ NO_3^- + 8\ H^+ + 3\ Cu\ (s) \rightarrow 3\ Cu^{2+} + 2\ NO + 4\ H_2O$
d) $3\ NO_3^- + 6\ H^+ + 2\ Cu\ (s) \rightarrow 2\ Cu^{2+} + NO + 3\ H_2O$
e) $6\ H^+ + 3\ NO_3^- + 2\ Cu^{2+} \rightarrow Cu\ (s) + NO + 3\ H_2O$

65. The value of Eº for the following reaction is 0.63 V. What is the value of E for this reaction when the concentration of $Zn^{2+}$ is 0.00020 *M* and the concentration of $Pb^{2+}$ is 1.0 *M*?

Pb2+ (aq) + Zn (s) → Zn2+ (aq) + Pb (s)

a) 0.52 V
b) 0.85 V
c) 0.41 V
d) 0.74 V

66. If a current of 6 amps is passed through a solution of $Ag^+$ for 1.5 hours, how many grams of silver are produced?

a) 0.604 g
b) 36.2 g
c) 0.335 g
d) 3.04 g
e) 1.00 g

Use the data in the following table to answer the following three questions:

| Standard Reduction Potentials at 25 ºC | Eº (V) |
|---|---|
| $F_2$ (g) + 2 $e^-$ → $F^-$ (aq) | 2.87 |
| $Cl_2$ (g) + 2$e^-$ → $Cl^-$ (aq) | 1.36 |
| $I_2$ (g) + 2$e^-$ → $I^-$ (aq) | 0.535 |
| $Ag^+$ (aq) + $e^-$ → Ag (s) | 0.80 |
| $Zn^{2+}$ + 2$e^-$ → Zn (s) | –0.14 |
| 2 $H_2O$ (l) + 2$e^-$ → $H_2$ (g) + 2 $OH^-$ (aq) | –0.828 |
| $Al^{3+}$ (aq) + 3$e^-$ → Al (s) | –1.66 |
| $K^+$ (aq) + $e^-$ → K (s) | –2.93 |

67. Predict the products at the cathode when electric current is passed through a solution of KI.

a) K (s)
b) $H_2$ (g)
c) $I_2$ (l)
d) $O_2$ (g)
e) $H_2O$ (l)

68. Calculate Eº for the following reaction:
$F^-$ (aq) + $Cl_2$ (g) → $F_2$ (g) + 2 $Cl^-$ (aq)

a) –1.51 V
b) 8.46 V
c) –4.23 V
d) –8.46 V
e) 4.23 V

69. Which of the following is the best reducing agent?

a) $Ag^+$
b) Al
c) $F^-$
d) $Zn^{2+}$
e) $F_2$

70. Oxides of the alkaline earth family form

a) basic solutions
b) acidic solutions
c) gases with water
d) noble gas compounds
e) soluble sulfides

71. Which of the following methods are useful for the production of hydrogen gas?

a) metal + acid
b) carbonate + acid
c) acid + base
d) acid + alcohol
e) all of these

72. This element reacts with oxygen to form an oxide with the formula $XO_3$. When added to water, XO3 forms an acidic solution. Element X is

a) K
b) C
c) Mg
d) S

73. Which one of the following should be the most basic oxide?

a) CO
b) $CO_2$
c) $SO_2$
d) $N_2O$
e) BaO

74. The half-life of iodine-131 is 8.0 days. If you have 25.0 grams of iodine-131, how much will remain after 40 days?

a) 20.0 g
b) 5.00 g
c) 3.12 g
d) 0.781 g
e) 0.0390 g

75. This reaction is an example of _____ decay.

$$^{210}_{84}\text{Po} \longrightarrow {}^{206}_{82}\text{Pb} + \_\_\_\_\_$$

a) alpha
b) beta
c) gamma
d) positron

Answers:

| Problem | Answer | Problem | Answer | Problem | Answer | Problem | Answer |
|---|---|---|---|---|---|---|---|
| 1 | c | 20 | b | 39 | e | 58 | c |
| 2 | a | 21 | a | 40 | c | 59 | e |
| 3 | d | 22 | c | 41 | e | 60 | d |
| 4 | d | 23 | a | 42 | d | 61 | a |
| 5 | b | 24 | a | 43 | e | 62 | a |
| 6 | e | 25 | c | 44 | c | 63 | b |
| 7 | c | 26 | e | 45 | d | 64 | c |
| 8 | e | 27 | b | 46 | b | 65 | d |
| 9 | a | 28 | b | 47 | b | 66 | b |
| 10 | a | 29 | a | 48 | d | 67 | b |
| 11 | c | 30 | c | 49 | c | 68 | a |
| 12 | e | 31 | d | 50 | e | 69 | b |
| 13 | c | 32 | b | 51 | a | 70 | a |
| 14 | a | 33 | a | 52 | c | 71 | a |
| 15 | b | 34 | a | 53 | d | 72 | d |
| 16 | c | 35 | c | 54 | b | 73 | e |
| 17 | c | 36 | d | 55 | c | 74 | d |
| 18 | e | 37 | b | 56 | d | 75 | a |
| 19 | c | 38 | a | 57 | c | | |