1. 1s electrons have higher ionization energy ⇒ A

2. $1s^2 2s^2 2p^2$ is Carbon which likes quadruple bondage ⇒ C

3. $1s^2 2s^2 2p^5$ is F and F_2 is favored, D

4. single gaseous ⇒ ideal gas ⇒ E

5. $HCl + CaCO_3$ makes CO_2 gas, D

A

6. Na_2SO_4 and $BaCl_2$ make $BaSO_4$, so some kind of precipitate

I have no idea what color (A, B, or C)

7. $NaCl + K$ makes no precipitate, E

8. boiling is second phase transition, D

9. melting is first transition, B

10. gas heating is the end, E

11. titration curve looks like ∫ ⇒ E

12. should start at finite value and decay to asymptotic value ⇒ C

13. $PV = nRT$ so the (P, V) graph is a straight line $\Rightarrow$ [A]

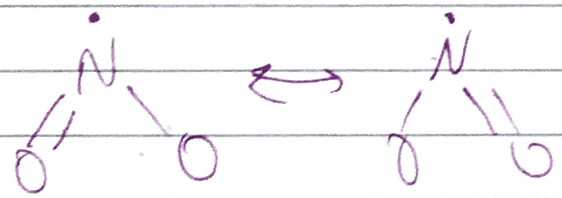
14. PV is a constant i.e. horizontal line $\Rightarrow$ [B]

15. definition of hydrate $\Rightarrow$ [D]

16. example of hydride is NaH $\Rightarrow$ [A]

17. hydrocarbon is organic $\Rightarrow$ [E]

18. CaO is ionic $\Rightarrow$ [E]

19.  [C]

20. decomposition, [B]

21. precipitation, [C]

22. oxidation state of Fe increases $\Rightarrow$ [A]

23. 1 is GS, 2 is first excited state $\Rightarrow$ [A]

24. by inspection (smallest height), [E]

25. ionization means electron ripped off to infinity
$\Rightarrow$ [C]

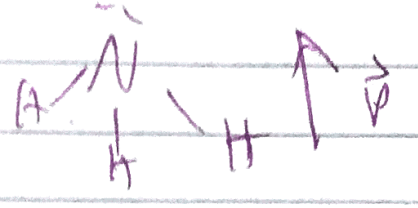
26. overall it's $(SO_3)^{2-}$ and O is 2^-
$\Rightarrow$ [E]

27. $11\text{ g propane} \cdot \frac{4\text{ mol water}}{1\text{ mol propane}} \cdot \frac{1\text{ mol propane}}{44\text{ g propane}}$
$= 1\text{ mol water}$, [A]

28. Zn increases oxidation # $\Rightarrow$ oxidized
Ag decreases $\Rightarrow$ reduced
[B]

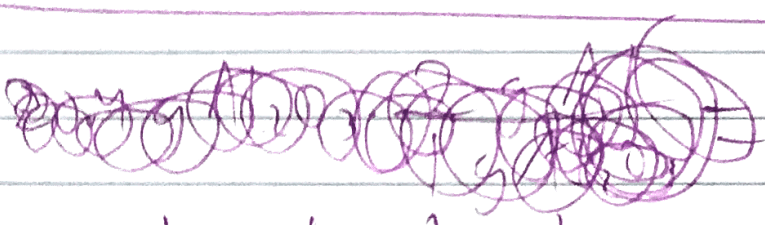
29. $2NH_3 + \frac{3}{2}O_2 \rightarrow N_2 + 3H_2O$
$\Rightarrow 4NH_3 + 3O_2 \rightarrow 2N_2 + 6H_2O$
[C]

30. 0.001 excess mole of strong base
$\Rightarrow \frac{0.01\text{ mol}}{1\text{ L}} \sim 10^{-3}\text{ M}$, $14-3=11$, [D]

31.  [C]

32 - iodine is a halogen $\Rightarrow$ 7 valence (The max)

[A]

33. 

Lithium has lowest molar mass $\Rightarrow$ [C]

34. $20.4\,g\,Al_2O_3 \cdot \frac{1\,mol\,Al_2O_3}{102\,g\,Al_2O_3} \cdot \frac{2\,mol\,Al}{1\,mol\,Al_2O_3} \cdot \frac{27\,g\,Al}{1\,mol\,Al}$

$= \left(\frac{54}{102} \cdot 20.4\right) g\,Al \approx 10.8\,g\,Al$

[D]

35 - probably big organic compounds?

[A]

36. catalyst does not affect equilibrium

$\Rightarrow$ [E]

37. $PV = nRT \Rightarrow V \sim \frac{1}{P} \Rightarrow$ [C]

38. $0.1\,mol \cdot \frac{147\,g}{mol} = 14.7\,g$, [C]

39. SiO_2 is covalent $\Rightarrow$ E

40. 5 oxygen on right, 6 on left

B

$5Pb(NO_3)_2 \rightarrow 5PbO + 10NO_2 + 6O_2$

$\Rightarrow$ C (silly mistake)

41. HNO_2 is weak acid $\Rightarrow$ A

42. container = 25.6 g
methanol = 7.4 g
density = $0.79 \frac{g}{mL}$ $\Rightarrow$ A

43. I has 2× hydrogen $\Rightarrow$ no
II is matched $\Rightarrow$ yes
III is 6C, 6H $\Rightarrow$ yes
} D

44. iron has 26, subtract 3 $\Rightarrow$ A

45. Ra is oxidation state 2+
$\Rightarrow$ B

46. bigger volume $\Rightarrow$ lower pressure $\Rightarrow$ D

47. 6 mol $KClO_3 \Rightarrow$ 18 mol O_2 D

48. $-394\,kJ + 396\,kJ = 2\,kJ$, D

49. 2 of the left $\Rightarrow$ B

50. I_2 is covalent $\Rightarrow$ D

51. twice as many Na^+ $\Rightarrow$ A

52. $pH = -\log(0.1) = 1 \Rightarrow$ A

53. 2 half-lives $\Rightarrow \frac{100}{4} = 25$, C

54. I and II have same number of chlorines $\Rightarrow$ B

55. by definition the oxidizing agent is reduced $\Rightarrow$ D

56. evaporates readily $\Rightarrow$ lots of gas $\Rightarrow$ B

57. definition of equilibrium constant $\Rightarrow$ D

58. (A) is synonymous with problem statement $\Rightarrow$ A

59. only HSO_4^- can donate or accept proton $\Rightarrow$ B

60. need 2 carbons on left, thus $3\,O_2$ on left $\Rightarrow$ B

61. $\frac{1}{2}$ mol Fe and $\frac{1}{4}$ mol S
$\Rightarrow$ $\frac{1}{4}$ mol FeS, $\frac{1}{4}$ mol Fe leftover $\Rightarrow$ [B]

62. $\frac{1}{2}$ mol H_2O $\Rightarrow$ 1 mol H, $\frac{1}{2}$ mol, 8 g O
liquid [redacted] is nonsense
[A]

63. $20°C \cdot 100g \cdot 4.18 \frac{J}{g°C} = 8360J$, [E]

64. no burner is needed for titration $\Rightarrow$ [A]

65. $0.1 \text{ mol HCl} \cdot \frac{-185 kJ}{2 \text{ mol HCl}} = -9.25 kJ$, [C]

66. increasing temperature adds heat
$\Rightarrow$ [B]

67. $Na + H_2O \rightarrow Na^+ + OH^- + H_2$
[E]

68. CO_2 seems safe for humans?
[B]

69. H = 1 g/mol
(~12 g/mol
16% H $\Rightarrow$ approx C_7H_{16} $\Rightarrow$ [E]

70. $\frac{\frac{1}{2}mv^2}{2L} = \frac{1}{4}Mv$, D

(Lazy so not writing explanations for this part)

101. $PV = nRT \Rightarrow$ T, F

102. T, F

103. T, T

104. T, F

105. T, T, CE

106. T, E

107. E, T

108. F, F

109. E, E

110. F, T

111. T, T, CE

112. F, T

113. T, F

114. F, T

115. F, F