CP Chem Final Review 1
Answer Section

MATCHING

1. ANS: C
2. ANS: A
3. ANS: B
4. ANS: E
5. ANS: D
6. ANS: F

7. ANS: D
8. ANS: E
9. ANS: B
10. ANS: F
11. ANS: A
12. ANS: C

13. ANS: A
14. ANS: E
15. ANS: D
16. ANS: B
17. ANS: C

18. ANS: A
19. ANS: B
20. ANS: E
21. ANS: F
22. ANS: C
23. ANS: D

24. ANS: B
25. ANS: D
26. ANS: A
27. ANS: C

MULTIPLE CHOICE

28. ANS: D
29. ANS: A
30. ANS: C
31. ANS: A
32. ANS: B
33. ANS: C
34. ANS: B

35. ANS: D
36. ANS: C
37. ANS: B
38. ANS: C
39. ANS: C
40. ANS: B
41. ANS: B
42. ANS: B
43. ANS: C
44. ANS: D
45. ANS: C
46. ANS: D
47. ANS: B
48. ANS: A
49. ANS: D
50. ANS: B
51. ANS: D
52. ANS: D
53. ANS: B
54. ANS: C
55. ANS: C
56. ANS: B
57. ANS: A
58. ANS: B
59. ANS: D
60. ANS: D
61. ANS: A
62. ANS: A
63. ANS: B
64. ANS: B
65. ANS: B
66. ANS: C
67. ANS: A
68. ANS: D
69. ANS: C
70. ANS: C
71. ANS: B
72. ANS: C
73. ANS: B
74. ANS: B
75. ANS: B
76. ANS: A
77. ANS: D
78. ANS: D
79. ANS: B
80. ANS: D

81. ANS: A
82. ANS: B
83. ANS: D
84. ANS: C
85. ANS: D
86. ANS: C
87. ANS: D
88. ANS: A
89. ANS: B
90. ANS: A
91. ANS: D
92. ANS: D
93. ANS: C
94. ANS: B
95. ANS: A
96. ANS: B
97. ANS: D
98. ANS: C
99. ANS: D
100. ANS: C
101. ANS: A
102. ANS: C
103. ANS: D
104. ANS: A
105. ANS: A
106. ANS: B
107. ANS: C
108. ANS: B
109. ANS: A
110. ANS: D
111. ANS: D
112. ANS: C
113. ANS: C
114. ANS: D
115. ANS: D
116. ANS: D
117. ANS: A
118. ANS: B
119. ANS: C
120. ANS: D
121. ANS: A
122. ANS: D
123. ANS: C
124. ANS: B
125. ANS: C
126. ANS: B

127. ANS: C
128. ANS: C
129. ANS: A
130. ANS: C
131. ANS: A
132. ANS: B
133. ANS: C
134. ANS: B
135. ANS: B
136. ANS: A
137. ANS: A
138. ANS: C
139. ANS: B
140. ANS: B
141. ANS: B
142. ANS: A
143. ANS: C
144. ANS: C
145. ANS: B
146. ANS: D
147. ANS: C
148. ANS: B
149. ANS: B
150. ANS: B
151. ANS: C
152. ANS: A
153. ANS: B
154. ANS: C
155. ANS: D
156. ANS: B
157. ANS: B
158. ANS: D
159. ANS: A
160. ANS: A
161. ANS: A
162. ANS: A
163. ANS: C
164. ANS: A
165. ANS: A
166. ANS: A
167. ANS: A
168. ANS: C
169. ANS: B
170. ANS: D
171. ANS: D
172. ANS: A

173. ANS: C
174. ANS: A
175. ANS: C
176. ANS: D
177. ANS: D
178. ANS: C
179. ANS: D
180. ANS: C
181. ANS: B
182. ANS: A
183. ANS: B
184. ANS: B
185. ANS: B
186. ANS: C
187. ANS: C
188. ANS: A
189. ANS: D
190. ANS: D
191. ANS: A
192. ANS: A
193. ANS: C
194. ANS: B
195. ANS: C
196. ANS: A
197. ANS: A

SHORT ANSWER

198. ANS:
0.003 10 m
199. ANS:
5.2 g
200. ANS:
9 L
201. ANS:
3.57 m
202. ANS:
one: 9×10^{-31} kg; two: 9.1×10^{-31} kg; three: 9.11×10^{-31} kg; four: 9.109×10^{-31} kg
203. ANS:
3.43 cm $\times$ 5.2 cm = 18 cm^2
204. ANS:
$^\circ$C = K – 273 = 128 – 273 = –145°C
205. ANS:
0.05 g $\times$ 1 kg/1000 g = 0.000 05 kg
206. ANS:
0.06 L $\times$ 1 m^3/1000 L = 0.000 06 m^3

207. ANS:
Density = mass/volume = 4.0 g/39.0 cm^3 = 0.10 g/cm^3

208. ANS:
Volume = mass / density = (5.40×10^2 g) / 7.73 g/cm^3 = 69.9 cm^3

209. ANS:
12.0 mol of H_2O

210. ANS:
8.6 L H_2/ (22.4 L/1 mol) $\times$ 2 mol H_2O/2 mol H_2 $\times$ 22.4 L/ 1 mol = 8.6 L H_2O

211. ANS:
3/2

212. ANS:
1.45 g $\times$ 1.00 mol/237 g $\times$ 6.02×10^{23} molecules/1.00 mol
= 3.68×10^{21} molecules

213. ANS:
3.10×10^{23} molecules $\times$ 1 mol F_2/6.02×10^{23} molecules $\times$ 38.0 g F_2/1 mol F_2
= 19.6 g F_2

214. ANS:
607 g Ar $\times$ 1 mol Ar/39.9 g Ar = 15.2 mol Ar

215. ANS:
1.40×10^{23} molecules N_2 $\times$ (1.00 mol N_2/6.02×10^{23} molecules N_2) $\times$ (28.0 g N_2/1 mol N_2)
= 6.51 g

216. ANS:
0.520 atm $\times$ 760 mm Hg / 1 atm = 395 mm Hg

217. ANS:
622 mm Hg $\times$ 1 atm / 760 mm Hg = 0.818 atm

218. ANS:
0 K
–273.15°C

219. ANS:
5.85 kPa

220. ANS:
101.3 kPa $\times$ 1 atm/101.3 kPa = 1.00 atm

221. ANS:
90°

222. ANS:
$$V_2 = V_1 \times \frac{P_1}{P_2} = 250 \text{ mL} \times \frac{340.0 \text{ kPa}}{50.0 \text{ kPa}} = 1700 \text{ mL}$$

223. ANS:
$$V_2 = V_1 \times \frac{T_2}{T_1} = 30.0 \text{ L} \times \frac{353 \text{ K}}{288 \text{ K}} = 34.3 \text{ L}$$

224. ANS:
T_1 = –55°C + 273 = 218 K
T_2 = 30.0°C + 273 = 303 K

$V_2 = V_1 \times \frac{T_2}{T_1} = 590\ \text{mL} \times \frac{303\ \text{K}}{218\ \text{K}} = 820\ \text{mL}$

225. ANS:

$P_2 = P_1 \times \frac{T_2}{T_1} = 340\ \text{kPa} \times \frac{273\ \text{K}}{713\ \text{K}} = 140\ \text{kPa}$

226. ANS:

$P_1 \times V_1 = P_2 \times V_2$

$210\ \text{kPa} \times 15.0\ \text{L} = 790\ \text{kPa} \times V_2$

$\frac{210\ \text{kPa} \times 15.0\ \text{L}}{790\ \text{kPa}} = V_2$

$V_2 = 4.0\ \text{L}$

227. ANS:

$227°\text{C} + 273 = 500\ \text{K}$

$27°\text{C} + 273 = 300\ \text{K}$

$\frac{P_1}{T_1} = \frac{P_2}{T_2}\ ;\ \frac{710\ \text{kPa}}{500\ \text{K}} = \frac{P_2}{300\ \text{K}}$

$710\ \text{kPa} \times \frac{300\ \text{K}}{500\ \text{K}} = P_2$

$P_2 = 470\ \text{kPa}$

228. ANS:

$T_1 = 35.0°\text{C} + 273 = 308\ \text{K}$

$T_2 = 0.0°\text{C} + 273 = 273\ \text{K}$

$V_2 = P_1 \times V_1 \times \frac{T_2}{T_1 \times P_2}$

$V_2 = 97\ \text{kPa} \times 140\ \text{mL} \times \frac{273\ \text{K}}{308\ \text{K} \times 101\ \text{kPa}} = 120\ \text{mL}$

229. ANS:

$T_1 = 27°\text{C} + 273 = 300\ \text{K};\ P_1 = 101\ \text{kPa}$

$T_2 = –10°\text{C} + 273 = 263\ \text{K};\ P_2 = 95\ \text{kPa}$

$V_2 = P_1 \times V_1 \times \frac{T_2}{T_1 \times P_2} = (101\ \text{kP}) \times (3.5 \times 10^{5}\ \text{m}^{3}) \times \frac{263\ \text{K}}{300\ \text{K} \times 95\ \text{kPa}}$

$V_2 = 3.26 \times 10^{5}\ \text{m}^3$

230. ANS:

$250\ \text{mL} \times \frac{1\ \text{L}}{1000\ \text{mL}} = 0.25\ \text{L}$

$n = P\frac{PV}{RT} = \frac{300.0\ \text{kPa} \times 0.25\ \text{L}}{8.31\ (\text{L} \cdot \text{kPa})/(\text{K} \cdot \text{mol}) \times 300.0\ \text{K}} = 0.030\ \text{mol}$

231. ANS:

$$n = \frac{PV}{RT} = \frac{300.0\ \text{kPa} \times 25\ \text{L}}{8.31\ (\text{L} \cdot \text{kPa})/(\text{K} \cdot \text{mol}) \times 300\ \text{K}} = 3.0\ \text{mol}$$

232. ANS:

$$32\ \text{g}\ O_2 \times \frac{1\ \text{mol}\ O_2}{32\ \text{g}\ O_2} = 1\ \text{mol}\ O_2$$

$$P = \frac{nRT}{V} = \frac{1.0\ \text{mol} \times 8.31\ (\text{L} \cdot \text{kPa})/(\text{K} \cdot \text{mol}) \times 303\ \text{K}}{22.0\ \text{L}} = 110\ \text{kPa}$$

233. ANS:

$$\text{Rate}_{F_2} / \text{Rate}_{Cl_2} = \sqrt{(70.9 / 38.0)} = 1.4$$

ESSAY

234. ANS:
Precision is the reproducibility of a measurement made under the same conditions; accuracy is the closeness of a measurement to the true value of the measurement. The three measurements would be precise if they were very close to each other in value; they would be accurate if they were close to the actual 1-g mass of the sample. If the measurements are very close to each other, they are precise, regardless of how close they are to the real value. Therefore, the measurements could be precise, but not accurate.

235. ANS:
The answer of an addition or subtraction can have no more digits to the right of the decimal point than are contained in the measurement with the least number of digits to the right of the decimal point. The answer of a multiplication or division can have no more significant figures than the measurement having the least number of significant figures. For multiplication and division, the position of the decimal point has nothing to do with the number of significant figures.

236. ANS:
The metric system is important because of its simplicity and ease of use. The metric system is preferred for science because it is based on units that are multiples of ten, thus simplifying conversions between units. In addition, all necessary units can be derived from the seven basic units of the metric system.

237. ANS:
Both scales use the freezing point and boiling point of water as reference temperatures. The Celsius scale designates the freezing point of water as 0°C and the boiling point as 100°C. The region between these two points is divided into equal intervals called degrees. The Kelvin scale designates 0 K as the temperature at which the volume of an ideal gas would be zero. It is called the absolute zero because it is the lowest temperature that is theoretically attainable. Absolute zero corresponds to –273°C on the Celsius scale. The Kelvin scale uses degree intervals that are the same size as the intervals on the Celsius scale. The difference between the scales lies in how the zero point is chosen. On the Celsius scale, the zero point is the freezing point of water. On the Kelvin scale, it is the point at which the volume of an ideal gas would theoretically be zero. The scales are related by the formulas: K = °C + 273 or °C = K – 273.

238. ANS:
The air pressure increases. Squeezing reduces the enclosed volume of the balloon without changing the number of particles in the balloon. Consequently, the number of collisions between the particles and the balloon increases.

239. ANS:

The pressure increases when the gas is heated because increasing the temperature of the gas increases the average kinetic energy of the particles in the gas. With an increase in average kinetic energy, there will be an increase in the number of collisions between the particles and the container walls. In addition, because the particles are moving faster, on average, the collisions will occur with greater force. Both factors, the increased frequency of collision and the increased force of the collisions, contribute to the increase in pressure.

240. ANS:
Adding air increases the number of gas particles in the tire. Collisions of particles with the inside walls of the tire cause the pressure that is exerted by the enclosed gas. Therefore, increasing the number of air particles increases the number of collisions, which in turn increases the pressure within the tire.

241. ANS:
An ideal gas is one that follows the gas laws at all conditions of pressure and temperature. The behavior of a real gas deviates from the behavior of an ideal gas, particularly at low temperatures and high pressures. Also, kinetic theory assumes that the particles of an ideal gas have no volume and are not attracted to each other. This is not true for real gases. Real gases can be liquefied and sometimes solidified by cooling and applying pressure, but ideal gases cannot.

242. ANS:
Dalton's law of partial pressures states that, at constant volume and temperature, the total pressure exerted by a mixture of gases is equal to the sum of the partial pressures of the individual gases in the mixture. Mountain climbers carry oxygen tanks because at high altitudes, the total air pressure is much lower than it is at sea level and the partial pressure of oxygen in the air is correspondingly lower, also. This low partial pressure of oxygen is not sufficient to support respiration.

243. ANS:
At constant temperature, particles all have the same average kinetic energy. The formula for kinetic energy is $KE = 1/2\ mv^2$. At constant temperature, the KE is constant and the velocity is proportional to the square root of 1/*m*. Because the diffusion and effusion rates are directly proportional to the velocity at which a particle is moving, these rates are also proportional to the square root of 1/*m*. So the more mass a particle has, the more slowly it will diffuse or effuse.