GASES Review WORKSHEET

✓ Review Parts of KMT + different Gas Laws

1) B/C as Temp ↑ Pressure ↑ (directly related) so pressure buildup w/constant volume can will explode

2) B/C as Temp ↓ Volume ↓ (directly related)

3) STP = Standard temp and Pressure
Standard Temp = 0°C = 273 K
Standard Press = 1atm = 760 mmHg = 760 torr = 101.325 kPa

4) $\frac{360\ kPa}{} \Big| \frac{1\ atm}{101.325\ kPa}$ = **3.55 atm** $\Big| \frac{760\ mmHg}{1\ atm}$ = **2700.2 mm Hg**

5) Could ↑ temperature or ↓ pressure would ↑ volume

6) a) B b) C c) E d) F e) A f) D

7) a) A b) B c) C d) B e) A f) A g) C h) B

8) a) Same b/c same gas
b) Same b/c Same amount of gas
c) increase b/c smaller cylinder so it (molec) sides more often
d) decreases b/c compressing (in) cylinder
e) decreases b/c " pushes molecules closer
f) increases b/c more molecules per area = ↑ density

9) $P_T = P_1 + P_2 + P_3 \ldots$
50atm + 20atm + 10atm = **80 atm**

10) a) Volume + Temp – Charles'
b) Pressure + Volume – Boyles'
c) moles + Volume – Avagadro
d) P, V, moles, Temp = Ideal Gas Law

11) $PV = nRT$

- V → volume in L
- R → Ideal gas constant
- T → temp in Kelvin
- n → moles
- P → pressure

12) $R = .0821 \frac{atm \cdot L}{mol \cdot K}$ or $8.314 \frac{kPa \cdot L}{mol \cdot K}$

13) $PV = nRT$ $\quad PV = PV \quad (100\,kPa)(10\,mL) = P_f(2.0\,mL)$

$\boxed{500\,kPa}$

14) $PV = nRT$ $\quad \frac{V}{T} = \frac{V}{T} \quad \frac{2.00\,L}{(22+273)} = \frac{V}{(90+273)} = \boxed{2.46\,L}$

15) $PV = nRT$ $\quad PV = PV \quad (3.8\,atm)(196\,L) = P(26\,L)$

$\frac{26.6\,atm \mid 760}{1\,atm} = \boxed{21\,771.1\,mmHg}$

16) $PV = nRT$ $\quad \frac{PV}{T} = \frac{PV}{T} \quad \frac{(3.40\,atm)(10.0\,mL)}{(4+273)} = \frac{(1.02\,atm)(V)}{(12+273)}$

$\frac{103\,kPa \mid 1\,atm}{101.325\,kPa} = 1.02\,atm \quad \boxed{V = 34.3\,mL}$

17) $PV = nRT$

$\frac{940\,torr \mid 1\,atm}{760\,torr} = 1.24\,atm \quad (1.24\,atm)(.253\,L) = n(.0821 \frac{L \cdot atm}{mol \cdot K})(373\,K)$

$\boxed{n = .010\,moles}$

253 mL = .253 L

100 °C = 373 K

18) $PV = nRT_2$ $\quad \frac{P}{T} = \frac{P}{T} \quad \frac{.740\,atm}{(23+273)} = \frac{1.12\,atm}{T}$

$\frac{75.0\,kPa \mid 1\,atm}{101.325\,kPa} = .740\,atm \quad \boxed{T = 448\,K}$

19) $PV=nRT$ (✓✓✓?) $(2atm)(100L) = (3moles)(.0821 \frac{L \cdot atm}{mol K})T$

$\boxed{812K = T}$

20) $PV=nRT$ (✓✓?✓) $(5.6atm)(25L) = n(.0821 \frac{L \cdot atm}{mol K})(22+273)$

$\boxed{n = 5.78 moles}$

21) $PV=nRT$ (✓✓?✓) $(200atm)(30L) = n(.0821 \frac{L \cdot atm}{mol K})(300K)$

$\boxed{243.6 moles}$

22) $PV=nRT$ (✓? ✓✓) CO_2 $C_3H_8 + 5O_2 \rightarrow 3CO_2 + 4H_2O$

2 missing so need to convert first

30°C + 273 = 303K

$\frac{50g\ C_3H_8}{} \Big| \frac{1mol\ C_3H_8}{44g\ C_3H_8} \Big| \frac{3\ CO_2}{1\ C_3H_8} = 3.4mol\ CO_2 = n$

$(90kPa)(V) = (3.4mol)(8.314 \frac{kPa \cdot L}{mol K})(303)$

$\boxed{V = 95.5L\ CO_2}$

23) $PV=nRT$ (✓✓ ✓) O_2 @ STP so can convert

$\frac{1.46g\ Zn}{} \Big| \frac{1mol\ Zn}{65g\ Zn} \Big| \frac{3O_2}{2Zn} \Big| \frac{22.4L}{1mol\ O_2} = \boxed{.755L\ O_2}$

$PV=nRT$ (✓✓ ✓) → solve O_2 $(3.4atm)(3L) = n(.0821 \frac{L \cdot atm}{mol K})(328K)$

55+273 = 328

$n = .378\ mol\ O_2 \Big| \frac{2\ ZnO}{3O_2} \Big| \frac{81g\ ZnO}{1mol\ ZnO} = \boxed{20.45g\ ZnO}$

24) Lightest to heaviest

He (4g) Xe (131) HCl (36) Cl_2 (72)

He, HCl, Cl_2, Xe

25) a) effusion

b) diffusion

c) diffusion.

26) $rate = \frac{\sqrt{HCl}}{\sqrt{He}}$ $\frac{\sqrt{36.46}}{\sqrt{4.00}} = 3.02$ $\boxed{\text{He is 3.02x faster than HCl}}$

27) $3.16 = \frac{\sqrt{unk}}{\sqrt{4.00}}$ $3.16^2 = \frac{unk}{4.00} = \boxed{39.9g/mol}$