Boyle's Law Worksheet

① $P_1V_1 = P_2V_2$

$(99.0\ kPa)(300.0\ mL) = (188\ kPa)\ V_2$

$V = 158\ mL$

② $P_1V_1 = P_2V_2$

$(0.988\ atm)(1.00\ L) = P_2(2.00\ L)$

$P = 0.494\ atm$

③ $P_1V_1 = P_2V_2$

$(1.08\ atm)(145.7\ mL) = (1.43\ atm)\ V_2$

$V = 110.\ mL$

④ $P_1V_1 = P_2V_2$

$(0.980\ atm)(4.00\ L) = P_2(0.0500\ L)$

$P = 78.4\ atm$

⑤ $1\ atm = 101.3\ kPa$

$0.860\ atm = x$

$\frac{(101.3\ kPa)(0.860\ atm)}{1\ atm} = 87.118\ kPa$

$P_1V_1 = P_2V_2$

$(87.118\ kPa)(0.220\ L) = (29.2\ kPa)\ V_2$

$V = 0.656\ L$

⑥ $P_1V_1 = P_2V_2$

$(4 \times 10^6 \text{ atm})(0.05 \text{ L}) = (1 \text{ atm}) V_2$

$V_2 = 2 \times 10^5 \text{ L}$

⑦ $P_1V_1 = P_2V_2$

$(1 \text{ atm})(2 \text{ L}) = (6 \times 10^4 \text{ atm}) V_2$

$V_2 = 3.3 \times 10^{-5} \text{ L}$

⑧ $P_1V_1 = P_2V_2$

$(2 \times 10^6 \text{ atm})(1 \times 10^{-5} \text{ L}) = (0.275 \text{ atm}) V_2$

$V_2 = 72.7 \text{ L}$

⑨ $P_1V_1 = P_2V_2$

$(3.04 \times 10^4 \text{ mm Hg})(10 \text{ L}) = (150 \text{ mm Hg}) V_2$

$V_2 = 2027 \text{ L}$

⑩ $P_1V_1 = P_2V_2$

$(250 \text{ atm})(0.05 \text{ L}) = (50 \text{ atm}) V_2$

$V_2 = 0.25 \text{ L}$

Charles' Law Worksheet

① $\frac{V_1}{T_1} = \frac{V_2}{T_2}$ $\quad 89°C + 273 = 362\ K$

$\frac{0.67L}{362k} = \frac{1.12\ L}{T_2}$

$T = 605.13\ K$

$605.13k - 273 = \underline{332\ °C}$

② $80.0°C + 273 = 353\ k$
$30.0°C + 273 = 303\ k$

$\frac{V_1}{T_1} = \frac{V_2}{T_2}$

$\frac{3.00L}{353k} = \frac{V_2}{303k}$

$\underline{V = 2.58\ L}$

③ $25°C + 273 = 298\ K$
$0°C + 273 = 273\ K$

$\frac{V_1}{T_1} = \frac{V_2}{T_2}$

$\frac{0.620L}{298k} = \frac{V}{273k}$

$\underline{V = 0.55\ L}$

④ $\frac{V_1}{T_1} = \frac{V_2}{T_2}$

$\frac{0.5L}{295\ K} = \frac{V_2}{277\ K}$

$V_2 = 0.469\ L$

⑤ $\frac{V_1}{T_1} = \frac{V_2}{T_2}$

$\frac{0.4L}{293\ K} = \frac{V_2}{523\ K}$

$V_2 = 0.714\ L$

⑥ $\frac{V_1}{T_1} = \frac{V_2}{T_2}$

$\frac{250\ mL}{292\ K} = \frac{V_2}{333\ K}$

$V_2 = 285\ mL$

⑦ $\frac{V_1}{T_1} = \frac{V_2}{T_2}$

$\frac{2\ L}{298\ K} = \frac{V_2}{269\ K}$

$V_2 = 1.81\ L$

⑧ $\frac{V_1}{T_1} = \frac{V_2}{T_2}$

$\frac{2.2\ L}{291\ K} = \frac{V_2}{311\ K}$

$V_2 = 2.35\ L$

⑨ $\frac{V_1}{T_1} = \frac{V_2}{T_2}$

$\frac{2.3\ L}{298\ K} = \frac{400\ L}{T_2}$

$T_2 = 51826\ K$

⑩ $\frac{V_1}{T_1} = \frac{V_2}{T_2}$

$\frac{20\ L}{373\ K} = \frac{15\ L}{T_2}$

$T_2 = 280\ K$

Gay-Lussac's Law Worksheet

① $30^\circ C + 273 = 303\ K$

$$\frac{P_1}{T_1} = \frac{P_2}{T_2}$$

$$\frac{125\ kPa}{303\ K} = \frac{201\ kPa}{T_2}$$

$T = 487\ K$ or $214^\circ C$

② $25^\circ C + 273 = 298\ K$

$37^\circ C + 273 = 310\ K$

$$\frac{P_1}{T_1} = \frac{P_2}{T_2}$$

$$\frac{1.88\ atm}{298\ K} = \frac{P_2}{310\ K}$$

$P = 1.96\ atm$

③ $36.5^\circ C + 273 = 309.5\ K$

$$\frac{P_1}{T_1} = \frac{P_2}{T_2}$$

$$\frac{1.12\ atm}{T_1} = \frac{2.56\ atm}{309.5\ K}$$

$T = 135\ K$

(4) $0°C + 273 = 273\ K$

$$\frac{P_1}{T_1} = \frac{P_2}{T_2}$$

$$\frac{30.7\ kPa}{273\ K} = \frac{28.4\ kPa}{T_2}$$

$$T = 253\ K \text{ or } -20.5°C$$

(5) $22.0°C + 273 = 295\ K$

$44.6°C + 273 = 317.6\ K$

$$\frac{P_1}{T_1} = \frac{P_2}{T_2}$$

$$\frac{0.9\ atm}{295\ K} = \frac{P_2}{317.6\ K}$$

$$P = 0.97\ atm$$

(6) $20^\circ C + 273 = 293\ K$

$30^\circ C + 273 = 303\ K$

$$\frac{P_1}{T_1} = \frac{P_2}{T_2}$$

$$\frac{1}{293} = \frac{P_2}{303}$$

$$P_2 = \frac{(303)(1)}{(293)} = \boxed{1.03\ atm}$$

(7) $25^\circ C + 273 = 298\ K$

$125^\circ C + 273 = 398\ K$

$$\frac{P_1}{T_1} = \frac{P_2}{T_2}$$

$$\frac{0.5}{298} = \frac{P_2}{398}$$

$$P_2 = \frac{(398)(0.5)}{(298)} = \boxed{0.67\ atm}$$

(8) $25^\circ C + 273 = 298\ K$

$$\frac{P_1}{T_1} = \frac{P_2}{T_2}$$

$$\frac{47}{77} = \frac{P_2}{298}$$

$$P_2 = \frac{(298)(47)}{(77)} = \boxed{181.9\ mm\ Hg}$$

(9) $22^\circ C + 273 = 295\ K$

$0^\circ C + 273 = 273\ K$

$$\frac{P_1}{T_1} = \frac{P_2}{T_2}$$

$$\frac{745}{295} = \frac{P_2}{273}$$

$$P_2 = \frac{(273)(745)}{(295)} = \boxed{689.4\ mm\ Hg}$$

(10) $40^\circ C + 273 = 313\ K$

$$\frac{P_1}{T_1} = \frac{P_2}{T_2}$$

$$\frac{699}{313} = \frac{760}{T_2}$$

$$T_2 = \frac{(760)(313)}{(699)} = \boxed{340\ K \text{ or } 67^\circ C}$$

(11)

$$\frac{P_1}{T_1} = \frac{P_2}{T_2}$$

$$\frac{750}{323} = \frac{P_2}{273.15}$$

$$P_2 = \frac{(273.15)(750)}{(323)} = \boxed{634\ mm\ Hg}$$

(12) $-100^\circ C + 273 = 173\ K$

$25^\circ C + 273 = 298\ K$

$$\frac{P_1}{T_1} = \frac{P_2}{T_2}$$

$$\frac{30}{173} = \frac{P_2}{298}$$

$$P_2 = \frac{(298)(30)}{(173)} = \boxed{51.7\ kPa}$$

Avogadro's Law

① $5\ g\ O_2 \times \frac{1\ mol\ O_2}{32\ g\ O_2} = 0.156\ mol\ O_2$

$15\ g\ O_2 \times \frac{1\ mol\ O_2}{32\ g\ O_2} = 0.469\ mol\ O_2$

$$\frac{V_1}{V_2} = \frac{n_1}{n_2}$$

$$\frac{V_1}{7.2\ L} = \frac{0.469\ mol}{0.156\ mol}$$

$$V_1 = 21.6\ L$$

② $4\ g\ He \times \frac{1\ mol\ He}{4\ g\ He} = 1\ mol\ He$

$3\ g\ He \times \frac{1\ mol\ He}{4\ g\ He} = 0.75\ mol\ He$

$$\frac{V_1}{V_2} = \frac{n_1}{n_2}$$

$$\frac{V_1}{22.4} = \frac{0.75}{1}$$

$$V_1 = 16.8\ L$$

③ $\frac{V_1}{V_2} = \frac{n_1}{n_2}$

$\frac{V_1}{100\ L} = \frac{14.15\ mol}{3.25\ mol}$

$V_1 = 435.4\ L$

④ $\frac{V_1}{V_2} = \frac{n_1}{n_2}$

$\frac{10.4\ L}{93.2\ L} = \frac{n_1}{23.2\ g}$

$n_1 = 2.59\ g$