**Thermochemistry and Gas Laws Test Review**

1. Hess’s Law
	1. Calculate ΔH for the reaction: **P4O6 (s) + 2O2 (g) 🡪** **P4O10 (s)** given the information below.
		1. P4 (s) + 3O2 (g) 🡪 P4O6 (s) ΔH = -1640.1 kJ
		2. P4 (s) + 5O2 (g) 🡪 P4O10 (s) ΔH = -2940.1 kJ
	2. Calculate ΔH for the reaction: **CO (g) + 2H2 (g) 🡪 CH3OH (g)** given the information below.
		1. 2C (s) + O2 (g) 🡪 2CO (g) ΔH = -537 kJ
		2. 2C (s) + O2 (g) + 4H2 (g) 🡪 2CH3OH (g) ΔH = -402.4 kJ
	3. Calculate ΔH for the reaction: **C2H4 (g) + 6F2 (g) 🡪 2CF4 (g) + 4HF (g)** given the information below.
		1. H2 (g) + F2 (g) 🡪 2HF (g) ΔH = -537 kJ
		2. C (s) + 2F2 (g) 🡪 CF4 (g) ΔH = -680 kJ
		3. 2C (s) + 2H2 (g) 🡪 C2H4 (g) ΔH = +52.3 kJ
	4. Calculate ΔH for the reaction: **N2O (g) + NO2 (g) 🡪 3NO (g)** given the information below.
		1. N2 (g) + O2 (g) 🡪 2NO (g) ΔH = +180.7 kJ
		2. 2NO (g) + O2 (g) 🡪 2NO2 (g) ΔH = -113.1 kJ
		3. 2N2O (g) 🡪 2N2 (g) + O2 (g) ΔH = =163.2 kJ
2. Heat – use the equation **q = mCΔT (ΔT = Tfinal – Tinitial**) to solve the following problems.
	1. The specific heat capacity of octane is 2.22 J/gK. How much heat energy is required to raise the temperature of 80.0g of octane from 10.0°C to 25.0°C? Is this process endothermic or exothermic?
	2. A 45.0g block of copper is cooled down from 30.0°C to 15.0°C. The specific heat capacity of copper is .385 J/g°C. How much heat energy is released? Is this process endothermic or exothermic?
	3. 1500.J of heat is released when 99.88g of magnesium is cooled. The specific heat capacity of magnesium is 1.020 J/g°C. What is the change in temperature of the magnesium?
3. Heating Curves



 Heat Added 🡪

* 1. What state or states of matter exist at line segment I? What happens to the heat energy being added?
	2. What state or states of matter exist at line segment II? What happens to the heat energy being added?
	3. What state or states of matter exist at line segment III? What happens to the heat energy being added?
	4. What state or states of matter exist at line segment IV? What happens to the heat energy being added?
	5. What state or states of matter exist at line segment V? What happens to the heat energy being added?
	6. What is the melting/freezing point of this substance?
	7. What is the boiling/condensing point of this substance?
1. Gas Laws

**Boyle’s Law Charles’s Law Gay-Lussac’s Law Ideal Gas Law**

 **P1V1 = P2V2 V1T2 = V2T1 P1T2 = P2T1 PV = nRT**

 **R = .08206 L·atm/mol·K**

Units of temperature TKelvin = TCelsius + 273

1. Draw a simple graph to represent Charles’ and Gay-Lussac’s laws and explain what the graph means.
	1. For example Boyle’s Law – The graph below show that as the volume increases, the pressure decreases.
2. For each problem, determine which law you would use to solve the problem and then solve it!
	1. If 5.00L of neon gas is cooled from 24.0°C to -272°C, what is the new volume of the gas?
	2. If .214 atm of argon gas has a temperature of 200.0°C, what would the temperature of of argon gas with a pressure of 375.0°C occupy?
	3. If the pressure exerted on the gas in a weather balloon with a volume of 33.0 L decreases from 1.00 atm to .562 atm, what is the new volume of the weather balloon?
	4. 19.00. L of carbon dioxide gas 777°C. If some gas leaks out of the container so that its volume is now 1.200L, what is the temperature of the gas still in the container?
	5. A balloon was filled with 1.234L of helium gas to a pressure of .3456atm. What is the pressure in the balloon is the volume is increased to 2.345L?
	6. A 3.00 L container is filled with dinitrogen monoxide gas at 25.00°C. The container doubles in size. What is the new temperature inside the container?
	7. At what temperature does 16.3 g of nitrogen gas have a pressure of 1.25 atm in a 25.00L tank?
	8. What will the volume of a balloon filled with a sample of krypton gas be if 100.0 g of krypton is at -99.66°C at a pressure of 0.955?