## Discovering Charles's Law

The following table contains Celsius temperature and volume readings for a constant mass of a gas kept under constant pressure.

Volume (mL)	Temperature (°C)	Temperature (K)
100	-150	
141	-100	
181	-50	
222	0	
263	50	
303	100	
344	150	

1. Convert the given Celsius temperatures into Kelvin. (Recall: K = °C + 273)
2. Plot the values of temperature in kelvin and volume on the graph below, and connect the points
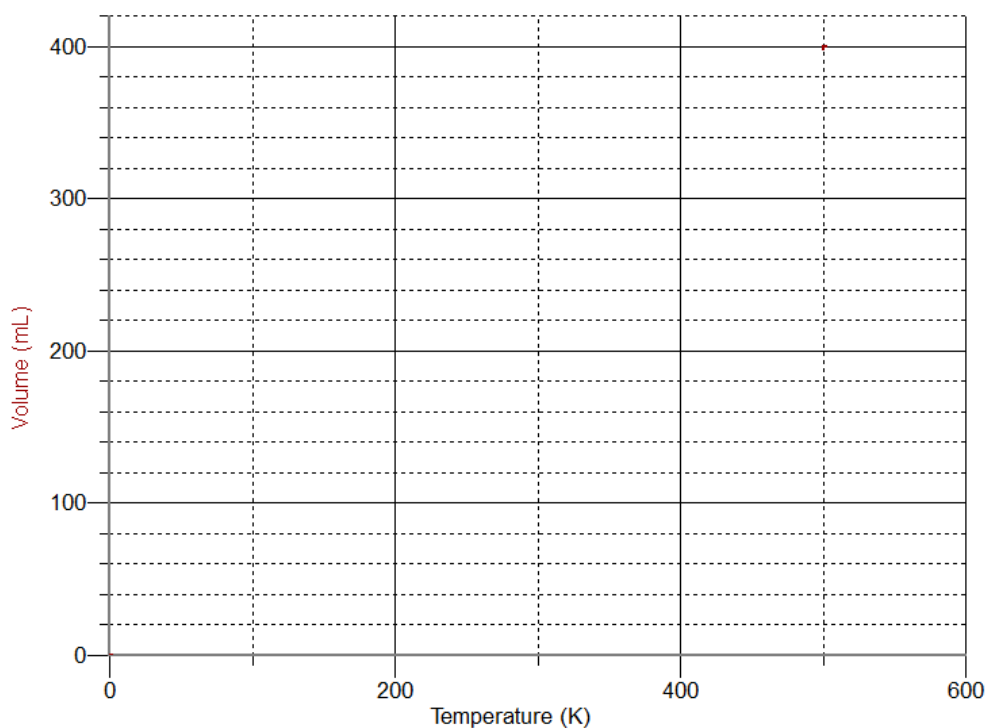
3. What is the shape of the graph you have drawn?_____

4. What is the relationship between volume and temperature when pressure and the number of moles are held constant?

Charles Law Problems

Make the following conversions:

100K = _____ °C = _____ °F

_____ K = 28 °C = _____ °F

273K = _____ °C = _____ °F

_____ K = _____ °C = 98.6 °F

_____ K = 100 °C = _____ °F

Solve these problems. Assume that the pressure is held constant.

1. If 10.0 L of CO_2 at 300 kPa is heated from 300K to 400K, what is the new volume? (13.3L)

2. A 25 L sample of Ar gas at STP is forced into a 50 L tank. What is the new temperature of the gas? (546 K)

3. If the volume of a 7 L tank at STP is doubled, what is the new temperature? (546 K)

4. If 20 L of He is cooled from standard temperature to 4 K, what is the new volume? (0.29 L)

5. A 100 L sample of Kr gas is heated to STP. If the temperature is then increased to 373 K, what would the new volume be?(136.6 L)