

## 12C – CHARLES' LAW

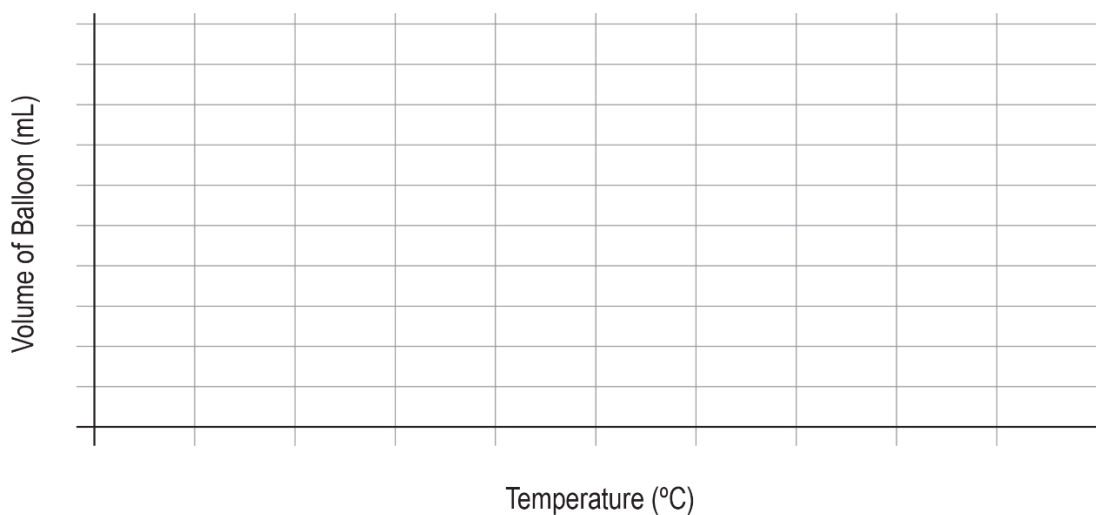
### Analysis

**Table 1 – Balloon volume**

	Temperature (°C)	Temperature (K)	Volume of balloon (mL)
Room temperature			
Ice bath			
Hot water bath			

1. Convert each temperature to K. Record your answers in Table 1.
2. Go to the second page of the SPARKlab. Sketch the volume vs temperature graph in Graph 1 below.

**Graph 1 – Volume vs. temperature**



3. Use the linear fit tool in SPARKvue to determine the slope,  $m$ , and the y-intercept,  $b$ , of your graph. Write these values on Graph 1. Include units with the values.

### Questions

1. What does the value of the slope,  $m$ , represent?

2. Is the relationship between temperature and volume in gases direct or inverse? Explain why this occurs based on what you observed in this lab.
3. Which gas properties must be held constant for this relationship to be true?
4. Which expression below would best represent the relationship between volume and temperature of a gas? Explain your answer.
- a.  $V \times T = k$       OR       $V_1 \times T_1 = V_2 \times T_2$
- b.  $V/T = k$       OR       $V_1/T_1 = V_2/T_2$
- c.  $V + T = k$       OR       $V_1 + T_1 = V_2 + T_2$
- d.  $V - T = k$       OR       $V_1 - T_1 = V_2 - T_2$
5. Why do you think the balloon changed in size as the surrounding temperature changed? Explain your answer in terms of the kinetic theory of matter.
6. Use the linear fit expression to find the temperature (in °C) when the volume of the balloon would be zero.
7. Where are possible sources of error in this experiment? If you were to perform this experiment again, how would you change it to obtain more accurate data?