

## Gas Law Questions A

### Boyle's Law

1. The pressure on 220 mL of a gas is 110 kPa. What will be the volume if the pressure is changed to 55.0 kPa while keeping the temperature constant? [440 mL]
2. A gas, initially at a pressure of 300 kPa is allowed to expand at a constant temperature until its volume has increased from 100 to 225 mL. What is the final pressure? [133 kPa]
3. In an experiment, a sample of nitrogen gas at 20°C was compressed from 300 mL to 0.360 mL. If the new pressure was found to be 0.4 kPa, what was the original pressure? [0.00048 kPa]
4. p. 344 #2,5 [#2:  $V_2 = 4V_1$ , #5:  $P_2 = 3P_1$ ]

### Charles' Law

5. If a sample of gas measures 2.0 L at 25°C, what is its volume at 50°C if the pressure remains constant? [2.17 L]
6. A sample of a gas whose volume at 27°C is 127 mL is heated at constant pressure until its volume becomes 317 mL. What is the final Celsius temperature of the gas? [476°C]
7. p. 342 practice problems #1,2 [#1: 1.075 L, #2: -124°C]

### Combined Gas Law

8. p. 344 practice problems #1,2 [#1: 1192 kPa, #2: 662 K or 389°C]
9. p. 344 #8 [617 kPa]
10. p. 379 #23, 24, 25 [#23: 1500K or 1227°C, #24: 16.6 MPa explodes, #25: 3586 kPa]
11. A gas has a volume of 225 mL at 75°C and 175 kPa. What will its volume be at a temperature of 20°C and a pressure of 100 kPa? [332 mL]
12. A gas storage tank is designed to hold a fixed volume of a gas at 175 kPa and 30°C. In order to prevent excessive pressure build-up by overheating, the tank is fitted with a relief valve that opens at 200 kPa. At what temperature will the relief valve open? [346K or 73°C]
13. A 200 mL sample of a gas is collected at 50.0 kPa and a temperature of 271°C. What volume would this gas occupy at 100 kPa and a temperature of -1°C? [50 mL]
14. A gas has a volume of 55.0 mL at 45°C and 85 kPa. What will its volume be at STP? [39.6 mL]
15. Natural gas is usually stored in large underground reservoirs or in above ground tanks. Suppose that a supply of natural gas is stored in an  $8 \times 10^5 \text{ m}^3$  underground reservoir at a pressure of 360 kPa and a temperature of 16°C. How many above ground tanks of volume  $2.7 \times 10^4 \text{ m}^3$  at a temperature of 6°C and a pressure of 120 kPa could be filled with the gas? [85.8]
16. A gas is contained in a spherical vessel of 450 mL volume at a pressure of 101 kPa. When a valve connecting the vessel to an adjacent evacuated chamber is opened to allow the gas to flow into the chamber, the pressure stabilizes to 6.50 kPa. What is the volume of the adjacent chamber? [6542 mL]

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