

gon be 125 mL? B3

8. An oxygen sample occupies 80.0 mL at a temperature of  $-33\text{ }^{\circ}\text{C}$ . What will be its volume in milliliters at  $33\text{ }^{\circ}\text{C}$ ? B3
9. Some methane gas occupies 58.0 L at  $17\text{ }^{\circ}\text{C}$ . What will be the volume of the gas in liters at standard temperature? B3
10. Convert to standard conditions:  $304\bar{0}$  mL of hydrogen measured at  $27\text{ }^{\circ}\text{C}$  and  $70\bar{0}$  mm pressure. B4
11. Convert to standard conditions:  $38\bar{0}$  mL of nitrogen at  $3\bar{0}\text{ }^{\circ}\text{C}$  and 808 mm pressure. B4
12. Convert to standard conditions:  $19\bar{0}$  mL of oxygen at  $-23\text{ }^{\circ}\text{C}$  and  $75\bar{0}$  mm pressure. B4
13. A sample of ethane collected when the temperature is  $27\text{ }^{\circ}\text{C}$  and the pressure is 80.0 cm measures  $30\bar{0}$  mL. Calculate the volume in milliliters at  $-3\text{ }^{\circ}\text{C}$  and 75.0 cm pressure. B4
14. Given  $12\bar{0}$  mL of oxygen measured at  $17\text{ }^{\circ}\text{C}$  and  $38\bar{0}$  mm pressure, what volume, in milliliters, will the gas occupy at  $307\text{ }^{\circ}\text{C}$  and  $60\bar{0}$  mm pressure? B4

#### GROUP B

*These problems will be much easier to solve if you use a calculator.*

15. Hydrogen, 38.5 mL, was collected in a eudiometer by displacement of mercury. The mercury level inside the eudiometer was 28 mm higher than that outside. The temperature was  $23\text{ }^{\circ}\text{C}$  and the barometric pressure was 733 mm. Convert the volume of hydrogen to STP. B7
16. Carbon dioxide collected by displacement of mercury in an inverted graduated cylinder occupies 65 mL. The mercury level inside the cylinder is 15 mm higher than that outside; temperature,  $18\text{ }^{\circ}\text{C}$ ; barometer reading, 754 mm. Convert the volume of carbon dioxide to STP. B7
17. Argon is collected by water displacement in a eudiometer. Gas volume, 29.2 mL; liquid levels inside and outside the eudiometer are the same; temperature,  $21\text{ }^{\circ}\text{C}$ ; barometer reading, 742.0 mm. Convert the volume to that of dry argon at STP. B7
18. Some nitrogen is collected by displacement of water in a gas-measuring tube. Gas volume, 42.3 mL; liquid levels inside and outside the tube are the same; temperature,  $25\text{ }^{\circ}\text{C}$ ; barometer reading, 737.7 mm. Convert the volume to that of dry nitrogen at STP. B7
19. A volume of 34.7 mL of oxygen is collected by water displacement. The water level inside the eudiometer is 43 mm higher than that outside. Temperature,  $22.5\text{ }^{\circ}\text{C}$ ; barometer reading, 724.5 mm. Convert the volume to that of dry oxygen at STP. B7
20. At  $18.5\text{ }^{\circ}\text{C}$  and 740.2 mm barometric pressure, 16.3 mL of hydrogen is collected by water displacement. The liquid level inside the gas-measuring tube is 237 mm higher than that outside. Convert the volume to that of dry hydrogen at STP. B7
21. The density of oxygen at STP is 1.43 g/L. What is the mass of exactly one liter of oxygen, if the pressure increases by  $4\bar{0}$  mm of mercury but the temperature is unchanged? B1
22. The density of nitrogen is 1.25 g/L at STP. Find the mass of exactly one liter of nitrogen at a temperature of  $39\text{ }^{\circ}\text{C}$ , if the pressure remains unchanged. B3
23. The density of carbon dioxide at STP is 1.98 g/L. Find the mass of exactly one liter of carbon dioxide at a temperature of  $27\text{ }^{\circ}\text{C}$  and at a pressure of  $90\bar{0}$  mm of mercury. B4
24. At  $2\bar{0}\text{ }^{\circ}\text{C}$  and 735 mm pressure,  $45\bar{0}$  mL of argon has a mass of 0.722 g. What is the density of argon in g/L at STP? B4
25. At a temperature of  $25\text{ }^{\circ}\text{C}$  and a pressure of  $80\bar{0}$  mm, a helium sample occupies  $40\bar{0}$  mL. To what Celsius temperature must the helium be cooled if its volume is to be reduced to  $36\bar{0}$  mL when the pressure is  $75\bar{0}$  mm? B4