Problem-Specific Instructions for TFs:

Question 1: Ask the students to read the question and contents of the containers before letting them work on problems (a)-(d). If they have a good grasp on the gas laws, they can minimize the number of calculations. For instance, in part (c), they can recall that molar volume of any ideal gas is 22.4 L, so they need only consider the number of moles in each. For part (d), they need consider the quotient T/M, which scales with the rate.

Question 3: They don't actually need the equation to solve the problem. But you can use it to ask a follow-up question. For instance, asking them to determine the amount of ATP produced or how much sugar is consumed.

Question 4: There are multiple ways to solve part (a). Some may choose to find total pressure first, then the mole fractions, and then partial pressures. Some will just use the ideal gas law to directly find the partial pressures. Either is fine, but it is worthwhile for you to point out they are equivalent because the gases don't interact.

For part (b), make sure they recognize they must find the limiting reactant first. If they have time, ask them to find the partial pressure of NO_2 formed and the new total pressure.

1. You have four identical 1.00 L **unbreakable** container**s** filled with gases. The molar masses of the gases are given in curly brackets {}. Assume all gases are ideal.

Flask A:	1.0 mol He	{4.00 g/mol}	100 K
Flask B:	0.40 mol CO	{28.01 g/mol}	400 K
Flask C:	1.0 atm Cl_2	{70.91 g/mol}	298 K
Flask D:	1.0 atm NO_2	{46.01 g/mol}	273 K

(a) Which flask has the greatest pressure?

(b) Which flask is at STP?

(c) In which flask would the contents take up the smallest volume if brought to STP?

(d) In which flask will diffusion of the gas be fastest?

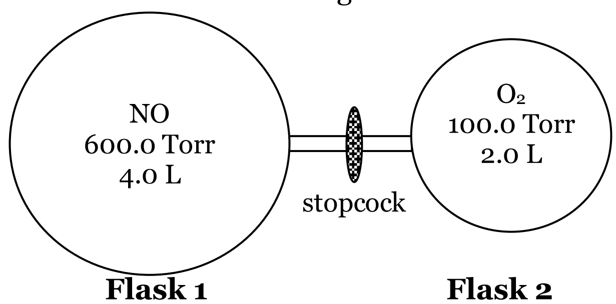
2. A gas tank has a volume of 32.0 L, a temperature of 27.0 °C, a pressure of 1.10×10^5 Torr, and contains 748 g of an unknown gas. What is the identity of the gas?

3. An average person consumes 31 g of O_2 per hour through the following balanced chemical equation (cellular respiration):

$$6\ O_2\ (g) + C_6H_{12}O_6\ (aq) \rightarrow 36\ ATP\ (aq) + 6\ CO_2\ (g) + 6\ H_2O\ (l)$$

What volume of O_2 (at STP) is consumed in 30.0 minutes?

4. Consider the following arrangement of two flasks at 400.0 K, connected by a stopcock. Assume that the gases are ideal and the tube connecting the two flasks has negligible volume.



(a) Assuming no chemical reaction between NO and O_2, calculate the partial pressures of NO and O_2 if the stopcock were opened. Assume no temperature changes.

(b) Now assume that when the stopcock is opened, the NO and O_2 react to form NO_2. Assume that there is no temperature changes.

Calculate the partial pressures of NO and O_2 after the reaction is complete.