

1 Pressure is force/area. The unit of pressure is the Pascal, Pa. What are the units of the Pa?

- A $\text{Pa} = \text{kg m}^2 \text{s}^{-2}/\text{m}^3$
- B $\text{Pa} = \text{kg m}^{-1} \text{s}^{-2}$
- C $\text{Pa} = 10^{-3} \text{ J/L}$
- D All of the above

2 Atmospheric pressure is defined as 101325 Pa. Which of the following is correct

- A $1 \text{ atm} = 1 \text{ bar}$
- B $1 \text{ atm} = 100000 \text{ Pa}$
- C $1 \text{ atm} = 101.325 \text{ J/L}$
- D All of the above

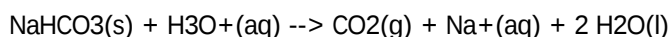
3 STP is 273.15 K, 1 atm. Which expression evaluates to the volume of 1 mol of gas at STP

- A $R T/P$
- B $P/R T$
- C $P V/R$
- D None of the above

4 What are the SI units of the molar volume $R T/P$

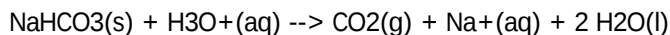
- A L atm/K/mol
- B J/Pa
- C m^3
- D None of the above

5 What is true about the following reaction?



- A There is a large increase in the volume of the system.
- B The volume of the system does not change much.
- C There is a large decrease in the volume of the system.
- D None of the above (products are in surroundings)

6 What is true about the following reaction?



- A The reaction vessel will cool.
- B There will be negligible temperature change.
- C The reaction vessel will warm.
- D More information needed.

- 7 $\text{NaHCO}_3(\text{s}) + \text{H}_3\text{O}^+(\text{aq}) \rightarrow \text{CO}_2(\text{g}) + \text{Na}^+(\text{aq}) + 2 \text{H}_2\text{O}(\text{l})$ is endothermic, and so the reaction vessel cools. Compared to the cooling in an open vessel, when the reaction is run in a closed vessel, the cooling is ...
- A the same
 - B greater (more endothermic)
 - C smaller (less endothermic)
- 8 $\text{NaHCO}_3(\text{s}) + \text{H}_3\text{O}^+(\text{aq}) \rightarrow \text{CO}_2(\text{g}) + \text{Na}^+(\text{aq}) + 2 \text{H}_2\text{O}(\text{l})$ is endothermic, and so the reaction vessel cools. Compared to cooling in a closed vessel, if the reaction is run so that the released gas drives a piston, the cooling will be ...
- A the same
 - B greater (more endothermic)
 - C smaller (less endothermic)
- 9 $\text{NaHCO}_3(\text{s}) + \text{H}_3\text{O}^+(\text{aq}) \rightarrow \text{CO}_2(\text{g}) + \text{Na}^+(\text{aq}) + 2 \text{H}_2\text{O}(\text{l})$ is endothermic, and so the reaction vessel cools. Compared to cooling in an open vessel, if the reaction is run so that the released gas drives a piston, the cooling will be ...
- A the same
 - B greater (more endothermic)
 - C smaller (less endothermic)
- 10 For the reaction $\text{NaHCO}_3(\text{s}) + \text{H}_3\text{O}^+(\text{aq}) \rightarrow \text{CO}_2(\text{g}) + \text{Na}^+(\text{aq}) + 2 \text{H}_2\text{O}(\text{l})$, what is the expression for the work done on the system, per reaction unit?
- A $w_{\text{sys}} = -P_{\text{ext}} dV_{\text{sys}}$
 - B $w_{\text{sys}} = -dn_{\text{g,sys}} R T/P_{\text{ext}}$
 - C Neither A nor B
 - D Both both A and B
- 11 For the reaction $\text{NaHCO}_3(\text{s}) + \text{H}_3\text{O}^+(\text{aq}) \rightarrow \text{CO}_2(\text{g}) + \text{Na}^+(\text{aq}) + 2 \text{H}_2\text{O}(\text{l})$, what is the expression for the work done on the system at STP, per reaction unit?
- A $w_{\text{sys}} = -dn_{\text{g,sys}} R T/P_{\text{ext}} = 22 \text{ L atm}$
 - B $w_{\text{sys}} = -dn_{\text{g,sys}} R T/P_{\text{ext}} = -22 \text{ L atm}$
 - C Neither of the above.
- 12 When a system forms a net of one mole of gas products at STP, $w_{\text{sys}} = -22 \text{ L atm}$. Compared to typical values of dE_{reaction} , is 22 L atm is ...
- A a large amount of energy.
 - B a similar amount of energy.
 - C a small amount of energy.