



أجب عن جميع الأسئلة بالقلم الجاف

الامتحان من ورقتين ( ٤ صفحات ) ستة أسئلة

Question no. 1: (10 marks)

Tank A containing 90% nitrogen is mixed with tank B containing 30% nitrogen to get tank C containing 65% nitrogen. You are asked to determine the ratio of the gas used from tank A to that used from tank B.

Question no. 2: (15 marks)

Butane is burned with air. No carbon monoxide is present in the combustion products. Calculate the molar composition of the product gas for each of the following cases:

- Theoretical air supplied, 100% conversion of butane.
- 20% excess air, 100% conversion of butane.
- 20% excess air, 90% conversion of butane.

Question no. 3: (10 marks)

A) Calculate the value of the gas law constant  $R$  in the following sets of units:

a)  $\text{atm cm}^3/(\text{gmol})(\text{K})$

b)  $\text{J}/(\text{gmol})(\text{K})$

(note that;  $1\text{atm} = 1.01325 \times 10^5 \text{ N/m}^2$ )

B) Calculate the average molecular weight of air from its approximate molar composition of  $N_2$  &  $O_2$ .

C) 4.38 Liter sample of gas under a pressure of 3.25 atm was pressurized under the same temperature to a new pressure of 10.9 atm. Calculate the new volume of this sample of gas in Liters.

باقى الأسئلة فى الورقة الثانية

أجب عن الأسئلة الآتية في نفس الورقة وأرفقها مع كراسة الإجابة

**Question no. 4:** (10 marks)

**A. Indicate whether the following statements are true or false:**

- 1) Differential aeration leads to the formation of a corrosion cell upon an isolated metal or alloy.
- 2) The theoretical air required to burn a given quantity of fuel does not depend on how much is actually burned.
- 3) The electrode of an electrolytic cell at which oxidation is the principal reaction called anode.
- 4) The percent excess air will be the same as the percent excess oxygen in combustion by oxygen.
- 5) You can define the limits of the system by drawing the system boundary.
- 6) Distillation is a physical process, in which there is no chemical reactions occur.
- 7) Raw water quality varies with the source.
- 8) Water softening can be achieved by ion exchange process.
- 9) The most famous and widely used equation that relates  $p$ ,  $V$ ,  $n$ , and  $T$  for a gas is the ideal gas law.
- 10) Steady state means that there is no process variables change with time.

**Question no. 5:** (5 marks)

Write the missing values on the following diagram.

