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Q# 1 (a) (i)

The Ideal Gas Law:

The gas constant R is a mathematical combination of all the individual gas law constant (C_b, C_c, C_g, C_a).

$$\frac{PV}{nT} = R$$

Ideal gas law more commonly written as:

$$PV = nRT \quad T(a)$$

where value of

$$R = \left[\frac{0.0821 \text{ L atm}}{\text{K mol}} \right]$$

where 'a' unit are:

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Q1 (a) (ii)

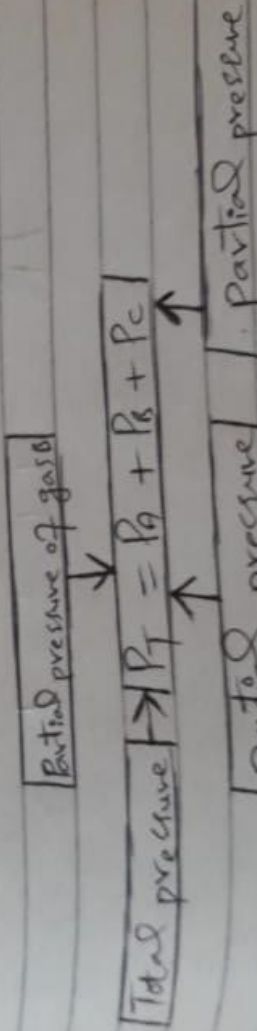
Dalton's Law of

Partial Pressure:

This Law states that:

“The total pressure of mixture of gases is the sum of partial pressures of its components”.

The partial pressure of a gas in mixture is the pressure that gas would exert if alone.



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Q1 (b)

Given:

$$P_1 = 4 \text{ atm}, V_1 = 4 \text{ L}, V_2 = 2.5 \text{ L}$$

Sol:

As we know:

$$P_1 V_1 = P_2 V_2$$

And:

$$\frac{P_1 V_1}{V_2} = \frac{P_2 V_2}{V_2}$$

So:

$$P_2 = P_1 V_1 / V_2$$

$$P_2 = (4 \text{ atm})(6 \text{ K}) / 2.5 \text{ K}$$

$$P_2 = (4 \text{ atm})(6) / 2.5$$

$$P_2 = 9.6 \text{ atm.}$$

(3)

(5)

Q#2 (a) :-

Key Factor of Good

Refrigerator:

- 1) Low viscosity
- 2) Having low freezing point
- 3) Having low boiling point
- 4) Having low heat capacity.
- 5) Having low specific volume.
- 6) Having low saturation pressure.
- 7) orderless
- 8) high latent heat of vaporization.
- 9) Good thermal conductivity.

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Q# 2 (b)

Vapour Absorption Refrigeration System:

The heat energy is used to fuel to achieve the refrigeration. An electric heater or steam is used to add the heat to refrigeration for its evaporation a pump and generator are used to complete the cycle.

Construction:

A throttle valve is connected between a evaporator and condenser. One pump is connected between an absorber and separator. Water is filled in absorber and it is connected to evaporator. The evaporator kept in storage.

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condenser and evaporator consists of pipes in coil form to provide more contact surface area for refrigerant.

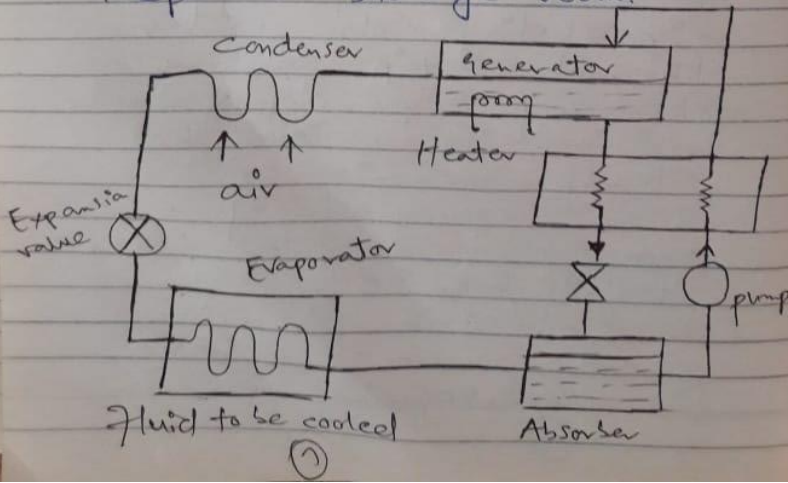
Working:

Dry ammonia vapour from the evaporator enter the absorber containing water where it is absorb by water becomes a strong ammonia solution with an increase in temperature. The heat generated during the process is removed to some extent by circulating cold water through a pipe otherwise absorbing capacity reduces with hot water. The strong ammonia solution is now pumped by a pump to generator where it is heated by an electric coil. As result ammonia solution (is now) vaporize and

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separates out from the water. It is then driven out from the solution to condenser where it is condensed and return to liquid state. Liquid ammonia is collected (where it is condensed and) in the receiver. The high pressure liquid ammonia is then passed through the throttle valve where it is expanded with decrease in temperature and pressure. Late it enter the evaporator kept in storage room.



Q#3

Ans:

Fire Tube Boilers:

These type of boilers consists of net of tubes through which the hot gases flow. These tubes being surrounded by water (science) since the contact area between the water and hot gases is greater than in case of shell tube type hence it has the ability to generate larger quantities of steam. It has efficiency definitely greater than shell tube type. The marine boilers and locomotive boilers are its examples. VDOX fire boiler is modern fire

(a)

Water Tube:

These are the most efficient boilers runs in the tube and the hot gases surrounded it hence the heat transfer area is low value.

(a)

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Q# 4 Ans :-

Stroke:

Def:

"A stroke is movement of the piston from top dead center (T.D.C) to bottom dead center (B.D.C) to T.D.C"

Four Stroke Engine:

Four stroke cycle engine works on four stroke principle there are 4 strokes in cycle of such engine. Four stroke cycle engine is also called "four - cycle engine" or "otto - cycle engine".

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1) Intake Stroke:

On the intake stroke, the piston is moving down, which produces a partial vacuum in the cylinder. The intake valve is open, therefore atmospheric pressure pushes the fresh air-fuel mixture into the cylinder through the intake valve.

2) Compression Stroke:

When the piston reaches the B.P.C. on the intake stroke, the intake valve closes. The piston moves up on the compression stroke. During this stroke, both the valves are closed, therefore

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moves up mixture inside
the cylinder is compressed.

3) Power Stroke:

During the compression stroke the piston (spark plug produces a spark) moves up it get near T.D.C the spark plug produces a spark which ignites the compressed air fuel mixture. Due to which the temperature and the pressure of gas rises. The pressure became about 600 psi. which push the piston down. As during this stroke we obtain power therefore it is called "power stroke"

Exhaust Stroke:

During the power stroke as the piston (then the piston moves up)

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reaches B.P.C the exhaust
valve opens. then the
piston moves up as exhaust
stroke. when the piston
moves up it pushes
out the burnt gases
from the cylinder
through exhaust valve.
When the piston reaches
I.D.C the exhaust
valve closes and intake
valve opens for
second cycle.

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Q# 5 (a)

Scavenging:-

"The process of expulsion of burnt gases and the entering of fresh air fuel mixture is scavenging."

The scavenging is 2 stroke engine is different than of 4 cycle engine. The slope of 2 stroke engine is slightly different it is somewhat pear shaped. It don't contain camshaft push rod rocker arm and valves. In stead of these have 2 ports i.e. "Exhaust port" and "Intake port" "Transfer port".

The cycle of 2 stroke

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in 2 revolution of crankshaft. so it mean that 2 stroke engine provide more power as compared to 4 engine.

As 2 stroke engine produce more power as compare 4 stroke engine so its weight to power ratio is less while its power to weight ratio is more.

As there are less moving parts in 2 stroke engine so it is easy to maintain it i.e. it have less maintainers.

It may accelerate rapidly it have more pop (pick)

stroke engine the

(b)

o' light fly wheel.

The work required to overcome the friction of exhaust and suction stroke is saved.

(b)

Provincial governments in Pakistan have banned the use of 2 stroke engine in auto rickshaws because:

- It is using more lubricating oil.
- It produce more noise as compared to four stroke engine.
- It produce chemical pollution.
- It use more fuel as compared to 4 stroke engine.

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In 2 stroke engine frequent cleaning of spark plugs are required as there are more carbon deposition on them its volumetric efficiency is less because the air fuel mixture has less the ¹ to move into cylinder.

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