



AL-Ayen University
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Department of Anesthesia



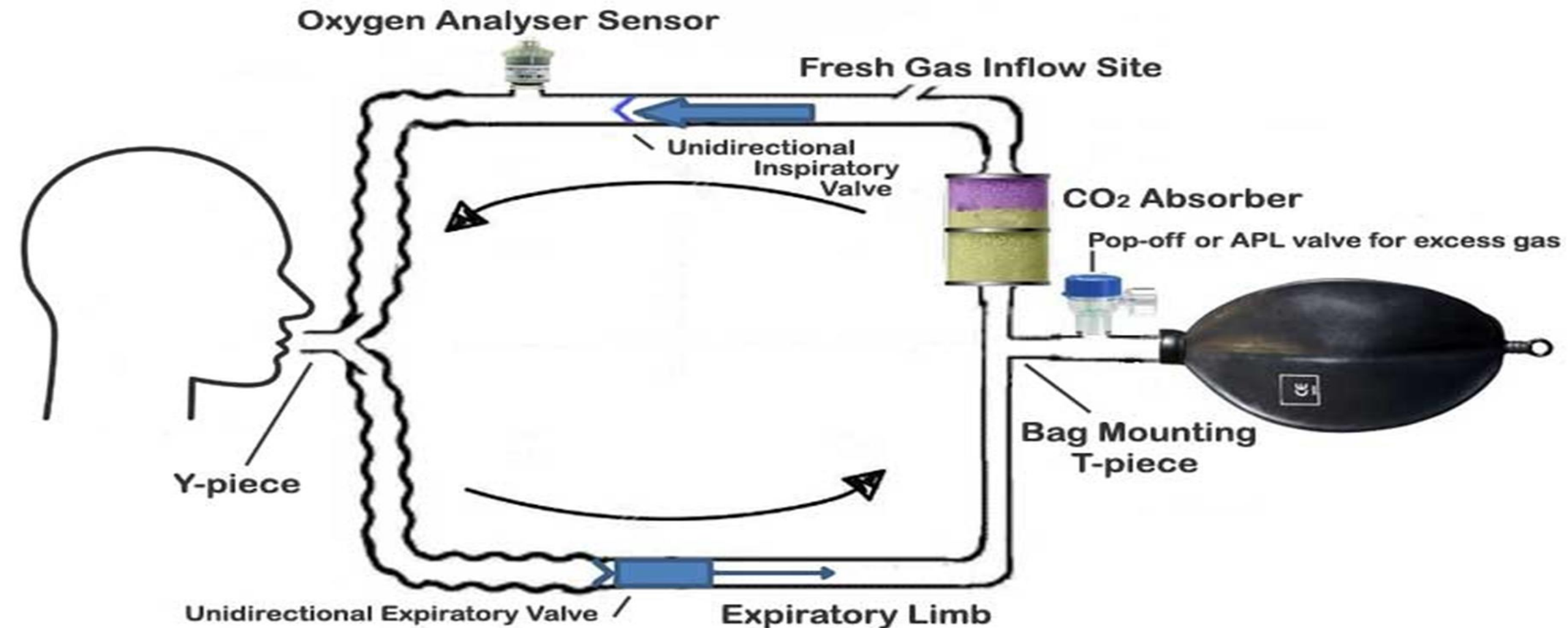
Scavenging System & Waste Anesthetic Gases(WAGs)

Lecture (6) theoretical
Basics of Anesthetic Equipment (1)
2nd Stage
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Definition:

Scavenging is the collection and removal of vented anesthetic gases from the operation room (OR). Since the amount of anesthetic gas supplied usually far exceeds the amount necessary for the patient, OR pollution (and the consequent threat to occupational health) is decreased by scavenging. If a fresh gas flow enters the breathing circuit each minute, the same flow must leave it or barotrauma will result.





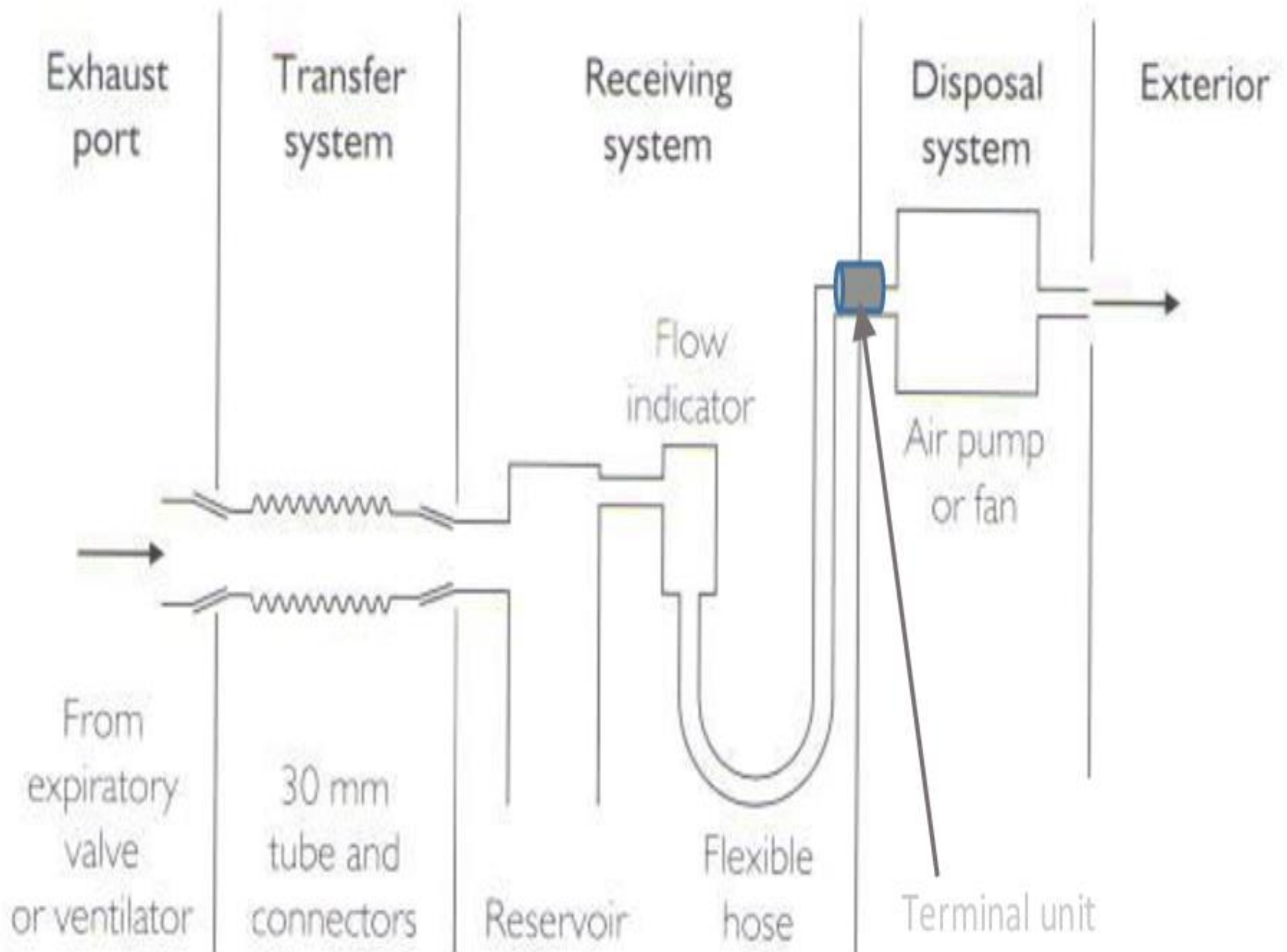


Figure 9.1: Components of the ACCC adapted from Basic Physics

Type of Scavenging system:

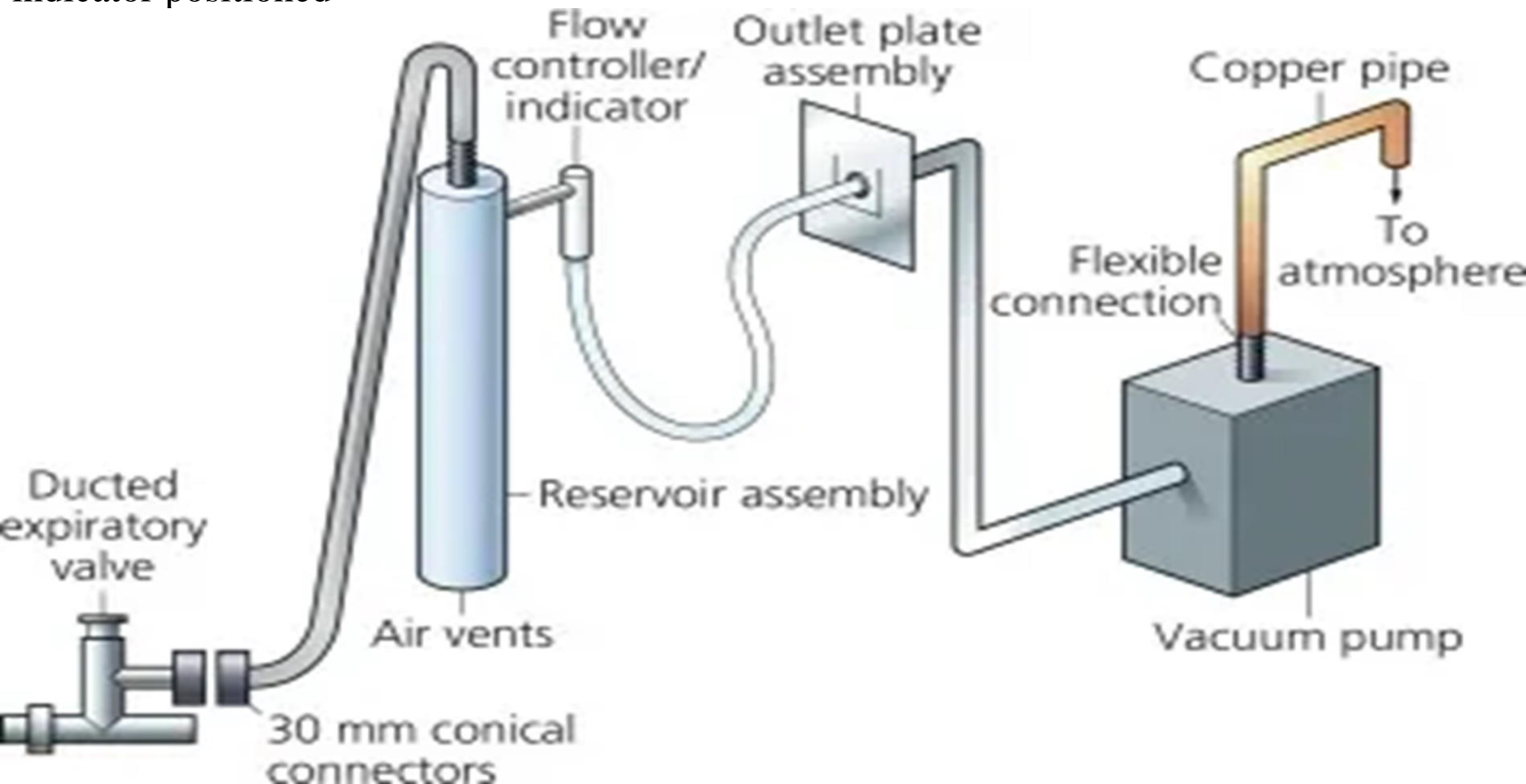
Scavenging may be active (suction applied) or passive (waste gases proceed passively down corrugated tubing through the room ventilation exhausted grill of the OR).

1- Active systems: require a means to protect the patients airway from the application of suction. A buildup of positive pressure.

- Active scavenging systems use suction, or a vacuum pump, to actively remove waste anesthetic gases from the breathing circuit and draw these gases into a scavenging system.
- The interface of an active system requires a negative pressure relief valve in order to prevent negative pressure from reaching the breathing circuit and affecting the patient's lungs

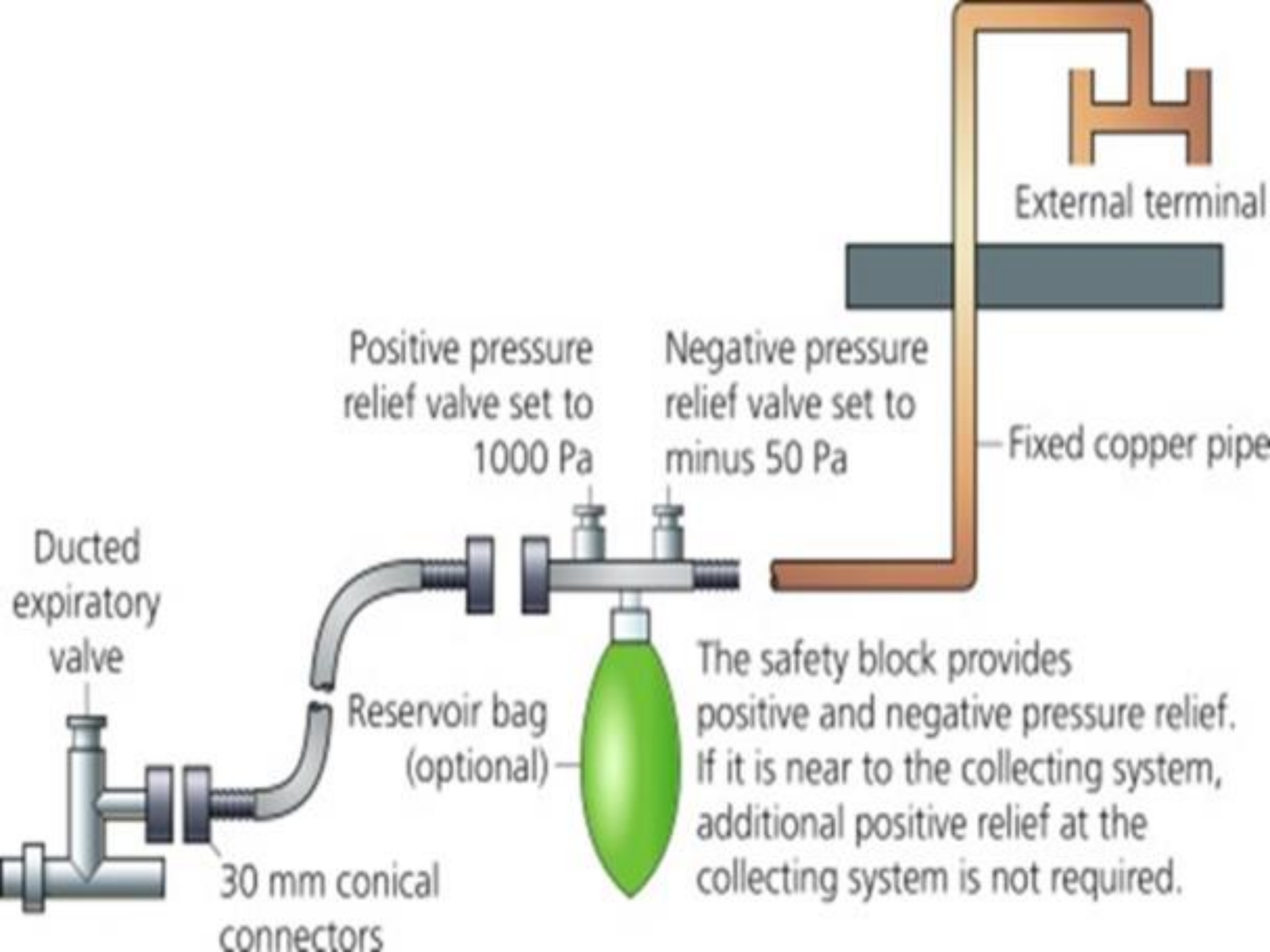
Components:

1. The collecting and transfer system which is similar to that of the passive system
2. The receiving system is usually a valveless, open-ended reservoir positioned between the receiving and disposal components. A bacterial filter situated downstream and a visual flow indicator positioned



2- passive system: require that the patient be protected from positive pressure buildup only.

- ✓ A passive scavenging system operates without the use of suction, since the positive pressure of gas in the breathing circuit pushes waste anesthetic gases into the scavenging system.
- ✓ One-way valves in the interface help to move waste anesthetic gases outdoors or into a non-recirculating air ventilation system.
- ✓ A passive scavenging system does not involve the use of a vacuum pump or suction



Components:

1. The collecting and transfer system which consists of a shroud connected to the adjustable pressure limiting (APL) valve (or expiratory valve of the ventilator).

A 30-mm connector attached to transfer tubing leads to a receiving system

2. A receiving system (reservoir bag) can be used. Two spring loaded valves guard against excessive positive pressures (1000 Pa) in case of a distal obstruction or negative pressures (-50 Pa) in case of increased demand in the scavenging system. Without these valves, excessive positive pressure increases the risk of barotrauma should there be an obstruction beyond the receiving system. Excessive negative pressure could lead to the collapse of the reservoir bag of the breathing system and the risk of rebreathing.

3. The disposal system is a wide-bore copper pipe leading to the atmosphere directly or via the theatre ventilation system.

Uses:

Scavenging systems are designed to reduce environmental anaesthetic gas concentrations by collecting waste gases and venting them outside the building.

How it works:

Scavenging systems may be divided into active or passive designs, depending on the disposal system used. Active systems use a pump to generate a negative pressure and require an open receiving system to prevent transfer of the negative pressure to the patient. Passive systems use the positive pressure generated by the patient's expiration to transmit gas to the atmosphere via a closed receiving system.

There are four components to a scavenging system:

1- Collecting system This typically connects to the adjustable pressure limiting (APL) valve, using a 30 mm connection to avoid accidental cross-connection with the breathing system.

2-Transfer system This is the corrugated plastic hose which connects the collecting system to the receiving system.

3- Receiving system Open receiving systems consist of a reservoir with a mesh-covered opening that is usually mounted on the anaesthetic machine. The opening allows compensation for variations in expiratory flow without generating positive or negative pressures. Open receiving systems are used in active scavenging. Closed receiving systems consist of a length of tubing with positive and negative pressure relief valves. The valves open at +5 cmH₂O and -0.5 cmH₂O respectively. In the absence of a relief valve, pressure may increase if the system is blocked or decrease if the opening is in a windy area. Many systems also incorporate a reservoir bag, which reduces valve opening by accommodating small variations in pressure and therefore increases efficiency of scavenging. The tubing in a passive system should be kept as short as possible to decrease the resistance.

4- Disposal system Modern hospitals use active scavenging with a high-flow, low-pressure vacuum system to draw exhaust gases from the receiving system and vent them to the atmosphere. This system is separate from the high pressure, low-flow vacuum used for suction. Passive systems consist of tubing that directly vents to the atmosphere through an external wall. They are affected by wind direction, and may lead to increased resistance to expiration.

Advantages:

- Required to reduce theatre pollution to within legal limits.
- Systems are simple and effective.

Disadvantages:

- Does not prevent environmental pollution (volatile anaesthetics are potent gases).
- Positive or negative pressures may be transmitted to the breathing system if the system is poorly designed or malfunctions

A top-down view of a desk setup. In the center is a white spiral-bound notebook with the words "THANK YOU!" printed in large, bold, black letters. The exclamation point is red. To the top left of the notebook are a pair of gold-rimmed glasses. To the right is a black and silver ballpoint pen. In the bottom left corner is a small white pot containing a green succulent plant. The entire scene is set on a light-colored, wood-grained surface.

**THANK
YOU!**