



WINTER- 2018 EXAMINATION

Subject Code:

17544

Model Answer

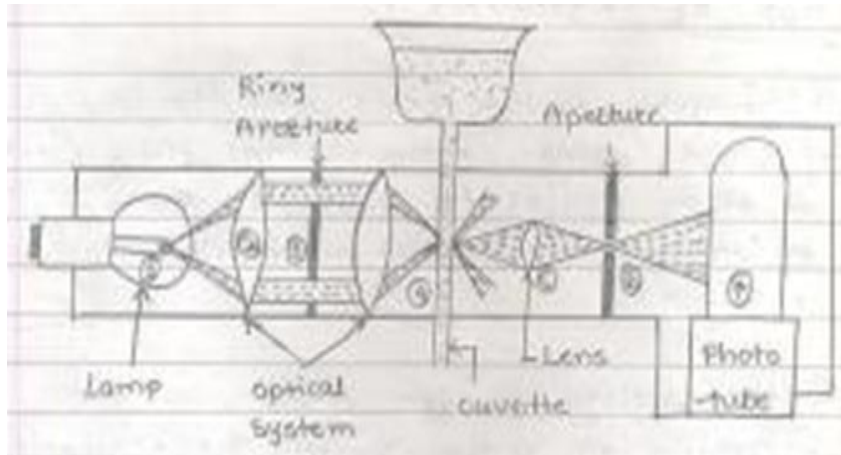
Important Instructions to examiners:

- 1) The answers should be examined by key words and not as word-to-word as given in the model answer scheme.
- 2) The model answer and the answer written by candidate may vary but the examiner may try to assess the understanding level of the candidate.
- 3) The language errors such as grammatical spelling errors should not be given more Importance Not applicable for subject English and Communication Skills.
- 4) While assessing figures, examiner may give credit for principal components indicated in the figure. The figures drawn by candidate and model answer may vary. The examiner may give credit for any equivalent figure drawn.
- 5) Credits may be given step wise for numerical problems. In some cases, the assumed constant values may vary and there may be some difference in the candidate's answers and model answer.
- 6) In case of some questions credit may be given by judgement on part of examiner of relevant answer based on candidate's understanding.
- 7) For programming language papers, credit may be given to any other program based on equivalent concept.

Q. No.	Sub Q.N.	Answer	Marking Scheme
1.	(A)	Attempt any THREE	12
	(a)	State Beer & Lambert's law. Ans: Beer lamberts law: The amount of energy absorbed or transmitted by a solution is proportional to the solution's molar absorptivity and the concentration of solute. In simple terms, a more concentrated solution absorbs more light than a more dilute solution does. Mathematical statement of Beer's law is $A = \epsilon lc$, Where: A = absorption; ϵ = molar absorptivity (amount of energy absorbed per mole of substance dissolved), l = path length (the thickness of the solution), and c = concentration of the solution.	04
	(b)	State importance of sterilization and list any four sterilizing equipments. Ans:- Importance of sterilization: Sterilization is a term referring to any process that removes or kills all forms of microbial life, including transmissible agents (such as fungi, bacteria, viruses, spore forms, etc.) present on a surface, contained in a fluid, in medication, or in a compound such as biological culture media. Sterilizing equipments: 1. Autoclave. 2. Hot air oven. 3. Ultrasonic cleaner. 4. Water bath. 5. Freezer. 6. Incinerator.	02 02

(c) Draw a neat labelled diagram of dark field blood cell counter.

Ans:



04

(d) List any four parts of electron microscope.

Ans:

Different parts electron microscope:

1. Light source
2. Electron gun
3. Mirror lenses.
4. Condenser system
5. Objective lens
6. Intermediate / Diffractions lens
7. Diaphragm
8. Eye piece.
9. Photomicrographic system

04

(B) Attempt any ONE

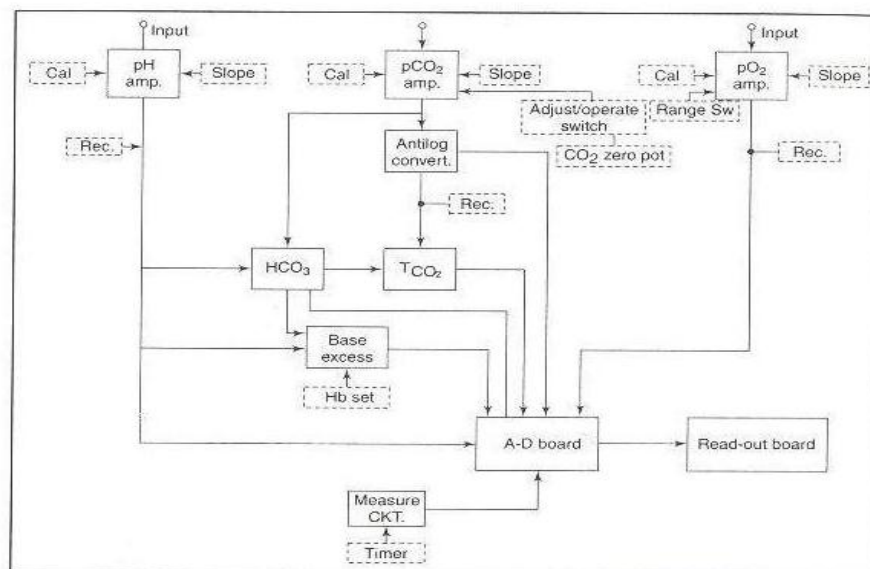
06

(a) Identify the equipment which is used to measure dissolved gases present in blood. Also draw its neat diagram.

Ans :

Blood gas analyzer is used to measure dissolved gases present in blood.

02

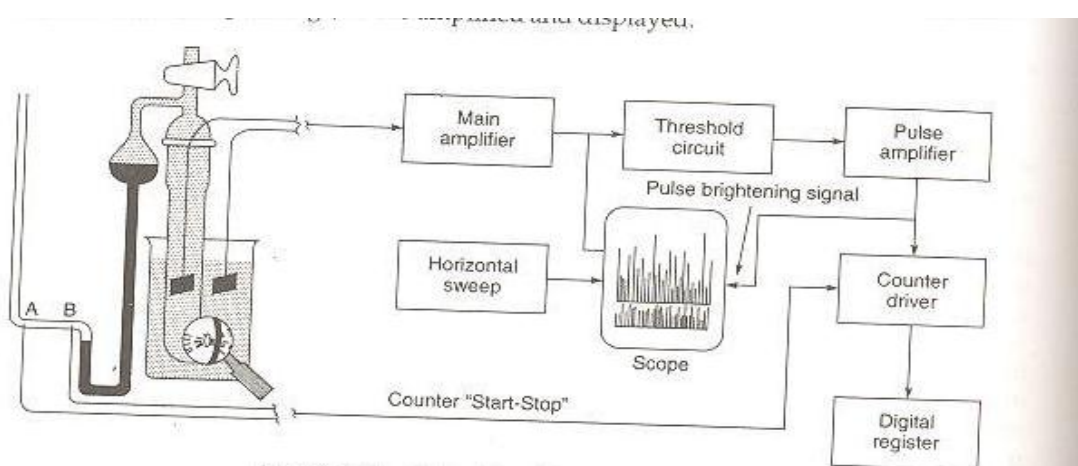
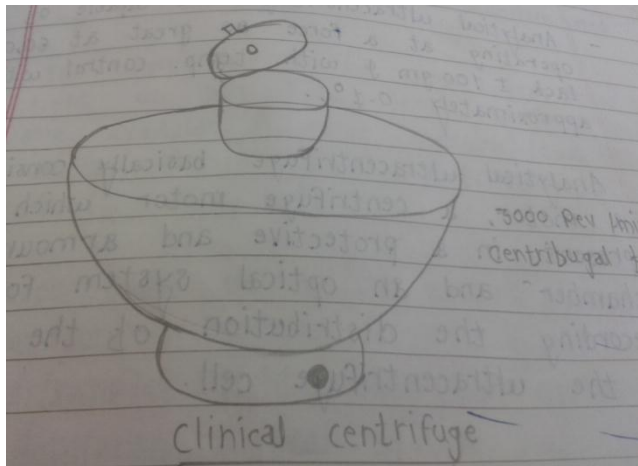


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Fig : Blood gas Analyzer.



	<p>(b) List any two applications and two technical specifications for the following equipment.</p> <p>(i) Autoclave (ii) Incinerator</p> <p>Ans:</p> <p>Application of Autoclave:</p> <ol style="list-style-type: none">1. Autoclaves are widely used to cure composites and in the vulcanization of rubber.2. Autoclaves are used for pre-disposal treatment and sterilization of waste materials.3. Autoclaves are used to sterilize the equipment's in the hospitals.4. Autoclaves are also used for sterilization of materials like gowns, dressing, gloves, etc <p>Specifications of Autoclave :</p> <ol style="list-style-type: none">1. Operating Voltage: 230 ±10VAC, 50 Hz.2. Capacity : 150-160L3. Timer : 0-10hr4. Pressure : 2.0 Kg/ cm² at 130 ° C5. Pressure gauge : 0-4 Kg/ cm²6. Temperature accuracy : ± 0.5 ° C7. Sterilization Temperature : Ambient 10 ° C -130 ° C8. Sterilization time range : 0-9h9. Material of chamber : SS 304 grade/316Ti grade with corrosion resistance10. Pressure resistance : Chamber pressure should resist 60 psi for safety11. Material exterior : Epoxy resin powder coated steel <p>Application of Incinerator :</p> <ol style="list-style-type: none">1. Dispose of Medical wastes2. Dispose of damaged organs3. Dispose of Burning of Placenta4. Disposable needle syringes5. Dispose of Surgical pads6. Dispose of Hand glows which are used in hospital7. To burn hygienic waste generated daily may be also saline bottles, dressing cottons & dangerous body parts, damage blood bags. <p>Specifications of Incinerator :</p> <ol style="list-style-type: none">1. Power Supply : 440V, 50Hz, 3 phase2. Temperature : Up to 1200°C or as required3. Capacity: 10 to 500 Kg / hr.4. Burning Efficiency : 98%5. Noise: <78db6. Body construction: Mild Steel, painted w/ heat resistant aluminum paint7. Type: Double chamber	06
2.	Attempt any FOUR	
	<p>(a) Define: (i) chromatography (ii) electrophoresis</p> <p>Ans:</p> <p>(i) Chromatography: Chromatography is a physical method of the separation of the components of mixture by distribution between two phase of which one is stationary which is having large surface area and other is fluid phase that percolate through the stationary phase</p> <p>(ii) Electrophoresis: is the motion of dispersed particles relative to a fluid under the influence of a spatially uniform electric field.</p>	02

	<p style="text-align: center;">OR</p> <p>A method of separating substances, especially proteins, and analyzing molecular structure based on the rate of movement of each component in a colloidal suspension while under the influence of an electric field.</p>	02
<p>(b)</p>	<p>Draw constructional diagram of electro-conductive blood cell counter. Ans :</p>  <p style="text-align: center;">Fig : Electro-conductive blood cell counter</p>	04
<p>(c)</p>	<p>What is centrifuge? Explain its working principle with neat diagram. Ans: Centrifuge is a device for separating two or more substances from each other by using centrifugal force. Working principle: This principle is used to separate out the particles in a liquid medium by sedimentation .The physical basis of the separation is the action of the centrifugal force on the rotating particles which increases with radius of rotational and The rate of sedimentation determination by the density of the particles such as dense particles sediment first followed by the lighter particles .Depending on the condition very light particles may even remain in suspensions.</p>  <p style="text-align: center;">Diagram of Clinical centrifuge (any relevant diagram)</p>	01 02 01

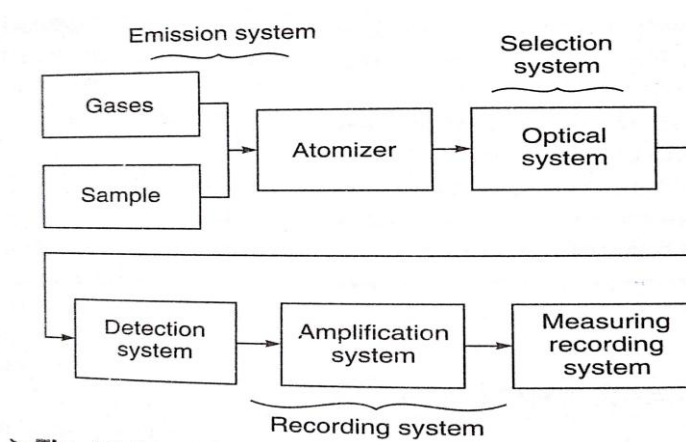
(d) Draw a constructional diagram of flame photometer and describe it.

Ans:

It has 3 essential parts.

- a) **Emission System:** Consisting of the following.
 - i) Fuel gases: and their regulation comprising the fuel reservoir, compressors, pressure regulators and pressure gauges.
 - ii) Atomizer: Consisting of sprayer and atomization chamber where the aerosol is produced and fed into the flame.
 - iii) Burner: Receives the mixture of combustion gases.
 - iv) Flame: the true source of emission.
- b) **Optical System:** It consists of the optical system for wavelength selection (filters or monochromators), lenses, diaphragms, slits etc.
- c) **Recording system:** It includes detectors like photocells, phototubes, photo multipliers etc. and electronic means of amplification measuring and recording.

02



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OR

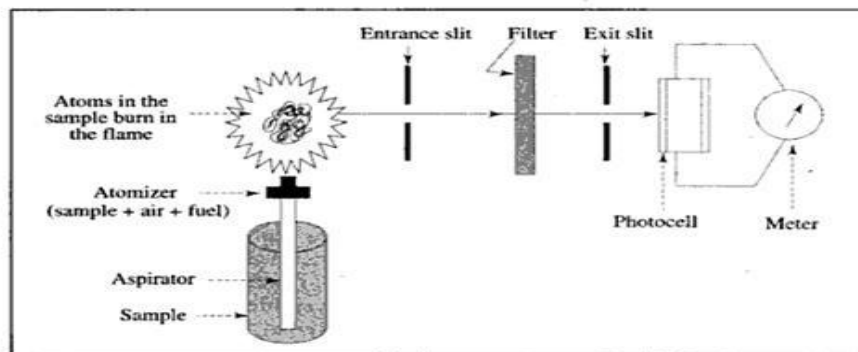


Fig. 7.1 Working principle of a flame photometer

Fig: Flame photometer

(e) List any four technical specification of Blood Gas Analyzer.

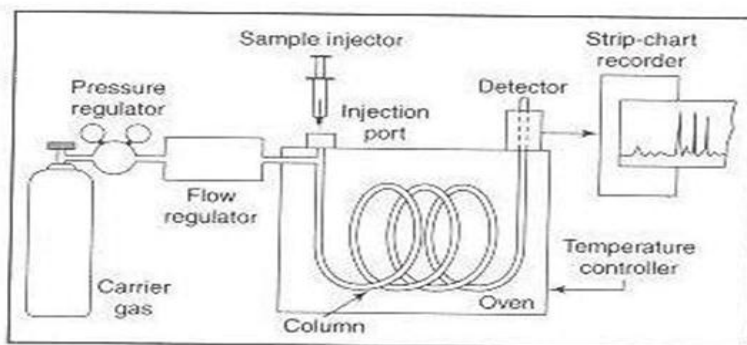
Ans:

1. Power supply:-200-240Vac 50Hz.
2. Measured parameters:- pH, pCO₂, pO₂, tHb, Barometric Pressure, Na⁺, K⁺, Ca⁺⁺, Cl⁻. All these parameters measured simultaneously
3. Sample volume:-less than 100ul.
4. Analysis time: – less than 60 sec.
5. Display: LCD color touch screen display.

04

(f) **With neat diagram explain working of Gas chromatography.**

Ans :



The basic parts of a gas chromatograph are shown in figure
It consists of the following parts.

- Carrier gas supply along with pressure regulator and flow monitor.
- Sample injection system.
- Chromatographic column
- Thermal compartment of thermostat
- The detection system
- The strip chart recorder

The carrier gas, normally N_2 , Ar or He is usually available in a compressed form in a cylinder fitted with a suitable pressure regulator. The gas is conducted from the cylinder through a flow regulator, to a sample injection port maintained at a certain temperature T_1 , which is such that it ensures rapid vaporization, but not thermal degradation of the solute. Gas and liquid samples are almost always injected by syringe through a self sealing silicon rubber diaphragm in the injection port. The solute vapor mixes almost instantaneously with the flowing carrier gas and is swept into the chromatographic column, which is the heart of the chromatography.

It is there that the different solutes in the vaporized sample are separated from each other, by virtue of their different interaction with the column packing. The column is maintained at another temperature T_2 . This temperature determines the time for the passage of the solutes and to some extent, the resolution and efficiency obtained with a particular column. At the end of the column the solutes emerging individually enter the detector which produces an electrical signal corresponding to the quantity of solute leaving the column. The detector signal is supplied to a potentiometer recorder and a plot of the time signal amplitude called chromatogram is obtained.

3.

Attempt any FOUR :

16

(a) **List any four instruments based on Beer & Lambert's Law.**

Ans:

- 1) Colorimeter
 - 2) Spectrophotometer.
 - 3) Flame photometer
 - 4) Filter Photometer
 - 5) Single beam Spectrophotometer
 - 6) Dual beam Spectrophotometer
- OR Any other relevant instrument

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(b) Draw neat labelled diagram of hot air Oven. Also explain its working.

Ans:

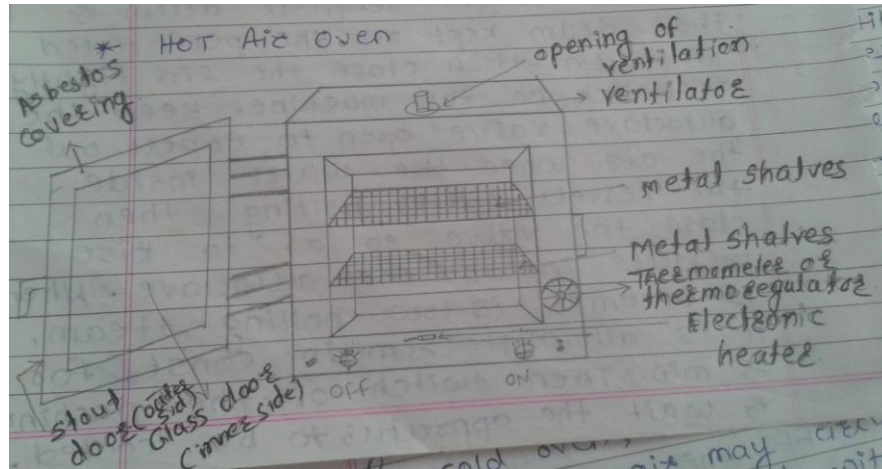


Fig : Hot Air Oven

Working: When electricity is passed through the heating coil electrical energy is converted to heat energy. The temperature is controlled by thermostat. It is most widely used method of dry sterilization by dry heat. The oven uses electrical as heat source. The oven is fitted with a fan to ensure adequate and even distribution of hot air in the chamber.

(c) With neat diagram explain the working of capillary electrophoresis.

Ans:

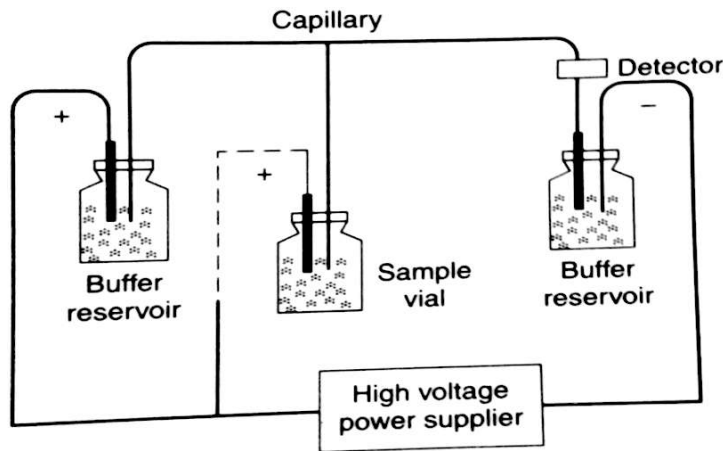


Fig shows the basic instrumental set of a capillary electrophoresis apparatus. It consists of high voltage power supply (0 to 30KV), a fused silica (SiO₂) capillary, two buffer reservoirs, two electrodes, and an on column detector. Sample injection is done by temporarily replacing one of the buffer reservoirs with a sample vial. A specific amount of sample is introduced by control lining either the injection voltage or the injection pressure. Capillary are typically of 50 micrometer inner diameter and 0.5 to 1 m in length. Capillary electrophoresis uses an electromotive force rather than the pump, to drive the mobile phase through the capillary. Due to electro-osmotic flow, all sample components migrates towards the negative electrode. A small volume of sample (10 nl) is injected at the positive end of the capillary and the separated components are detected near the negative end of the capillary.

(d) **List any four technical specifications of spectrophotometer and flame photometer.**

Ans:

Technical specifications of spectrophotometer:

1. Power : 230 V \pm 10% AC, 50 Hz (Battery operated)
2. Source :Tungsten-Halogen lamp (320-1100nm) Deuterium lamp (200-340nm)
3. Monochromator: Czerny-Turner
4. Detectors: 2-silicon photodiodes
5. Wavelength Range : 200–1100 nm
6. Wavelength Accuracy : ± 0.05 nm
7. Wavelength Repeatability : ± 0.02 nm

Technical specifications of flame photometer:

1. Power: 230 V \pm 10% AC, 50 Hz
2. Filter 10 nm Typical for Na and K
3. Minimum Sample Approx 3 ml per element (at Avg. Time of 4 sec.)
4. Operating Air Pressure 0.45 k / cm² (typical)
5. Aspiration Time (5 Sec + Avg. Time) per element + 4 Sec
6. Detector: Silicon Photodiode
7. Air supply: By oil free mini compressor unit with pressure regulator
8. Combustion gas: LPG controlled by precision regulator
9. Atomizer: Axial flow type
10. Burner : Stainless steel
11. Sensitivity: 0.1 ppm
12. Accuracy: $\pm 1\%$ upto 40 ppm, $\pm 2\%$ above 40 ppm
13. Readout: 5 Digit 7-Segment Bright Red LED Display
14. Flame system: LPG & dry oil free air

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(e) **Draw neat constructional diagram of**

(i) Colorimeter

(ii) Ultrasonic cleaner

Ans:

(i) Colorimeter

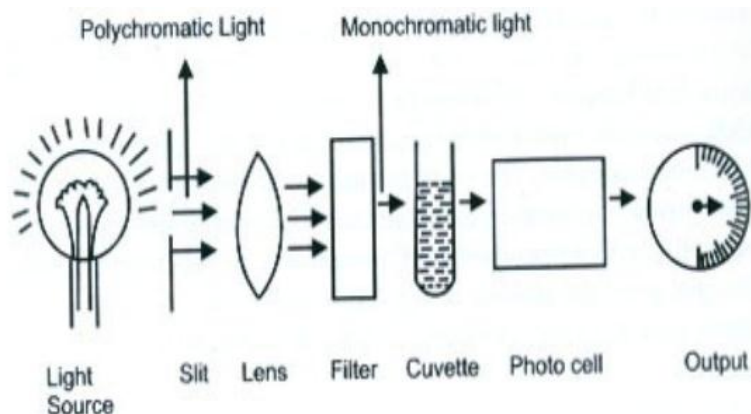
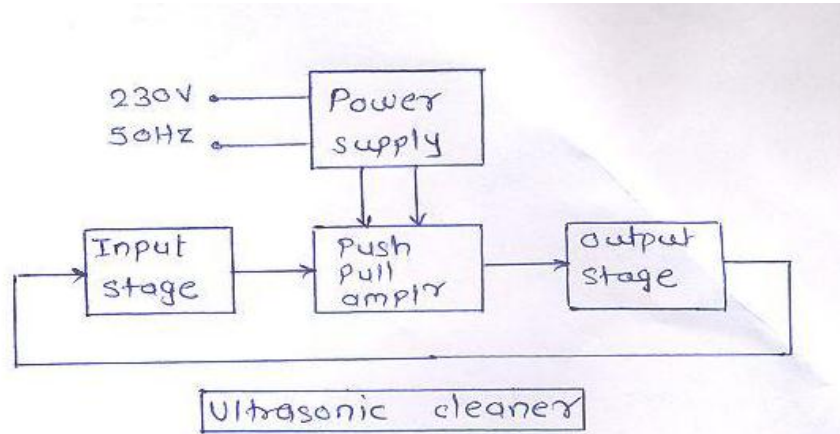


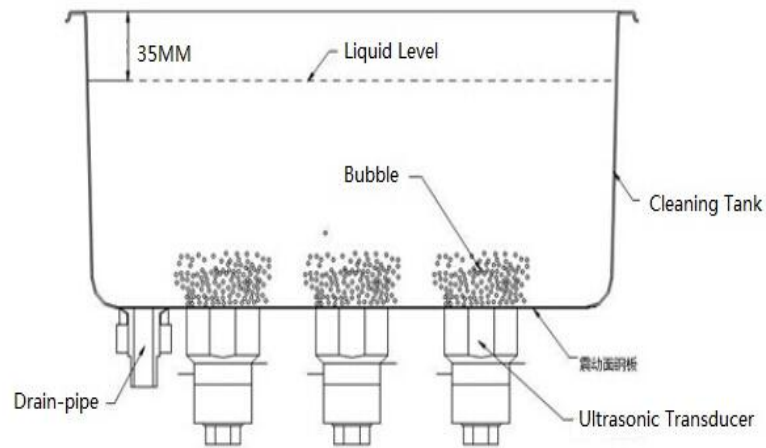
Fig. 27.1: Parts of the colorimeter

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(ii) Ultrasonic cleaner:



OR



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