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Summary of Measuring and Regulating Instruments
in Hydrogenation, DHD, and the Methanol Synthesis
From Dr. Pier's Files
Ludwigshafen, 17 February 1943

TABLE I

| Designation | Purpose | Application | Principle |
|---|---|---|---|
| Ring Gage | Quantity Measurement. | Hy, DHD, Meth. | Diff. press. on orifices produces proportional turning moment in gage. |
| Std. Nozzles & Baffles | Quantity Measurement. | Hy, DHD, Meth. | Produce a press. drop proportional to the square of the quantity. |
| Weighing Belt Feeder | Coal Dust & Catalyst Feeding | Hy | Regulation of height of layer on belt according to weight. |
| Diff. Pressure Recorder | Diff. Press. of Circ. Gas, Partial Press. Differences in Apparatus. | Hy, DHD | Piston loaded on both sides with weight equalization. |
| Photo-Electric Compensator | Measure temp. in converters | Hy, DHD, Meth. | Currentless thermal tension measurement by automatic tension compensation by means of photocells. |
| Temp. Controller | Measure temp. in converters accurately to 1/10 mV, alarm at excess temp. | Hy, DHD | Currentless thermal tension measurement in connection with automatic indicating device (Abtastvorrichtung). |
| Level Indicator | Height of letdown level in hot catchpot. | Hy | Measure the hydrostatic pressure of the liquid with flushing gas and ring gage. |
| Oil Level Indicator | Liquid level in product separator (cold catch pot) & other pressure vessels. | Hy, DHD, Meth. | Measure the loss of weight of an immersed metal rod by means of a spring gage with electromagnetic transmission to the outside. (Jolly Gage). |

Table I (Cont'd)

| Designation | Purpose | Application | Principle |
|---|---|---|---|
| Coal Paste Viscosimeter | Control viscosity of coal paste. | Hy | Measure the turning moment of a cylinder in coal paste revolving around it. |
| Heat of Reaction Indicator | $O_2$ in splitting gas. | Meth. | Heat of reaction. (Gmelin). |
| Heat of Reaction Indicator | $O_2$ in $N_2$ during regeneration | DHD | Heat of reaction of the $H_2$ passing thru measuring instrument in combustion with the $O_2$ in the controlled gas. |
| Heat Transmission Indicator | $H_2$ in $N_2$ before regeneration& $CO_2$ in $N_2$ during regeneration. | DHD | Heat transmission property of $H_2$ or $CO_2$. |
| Infra-red Absorption Device. | Check CO in air breathed. | Meth. | Absorption in infra-red spectrum. |
| $H_2S$ Recorder | $H_2S$ content in (Nullgas) $H_2$ free of $N_2$ produced from water gas. | Hy | Electrolytic Transmissibility |
| Density Recorder | Control the Composition. | Meth. | Time required for gas to flow out compared to air. |
| Double Density Recorder | Course of reaction, density of circulating gas. | Hy, DHD | Time required for gas to flow out compared to air. |
| Density Gage | Density of waste gases. | Hy, DHD | Buoyancy of a body in the gas. |
| Pressure Regulator | Regulation of pressure in columns, recycle-containers | Dist. | Diaphr'm valves controlled by spring manometers by means of compressed air. |

| Designation | Purpose | Application | Principle |
|---|---|---|---|
| Quantity Regulator | Regulate the supply to columns. | Dist. | Diaphr'm valves controlled by the differential pressure at orifice plates by means of compressed air. |
| Level Regulator | Regulate the level in the column sump and in containers. | Dist. | Diaphr'm valves for supply or discharge controlled by float by means of compressed air. |
| Temperature Regulator | Regulate the temp. in the columns and recycle container. | Dist. | Steam or cooling water valves electrically controlled by stirrup regulators. |

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