Indicators and Indicator Test Papers

INDICATORS

Change to read:

1. SCOPE

Indicators are required in Pharmacopeial tests and assays ▲either to indicate the completion of a chemical reaction in volumetric analysis or to indicate the hydrogen-ion concentration (pH) of solutions.▲USP41 The necessary solutions of indicators are listed among the *Test Solutions*, abbreviated TS.

2. PREPARATION OF SOME INDICATORS

Solution of indicators of the basic type and of the phthaleins are prepared by dissolving in alcohol.

With indicators containing an acidic group, the acid must first be neutralized with sodium hydroxide (NaOH) as follows. Triturate 100 mg of the indicator in a smooth-surfaced mortar with the volume of 0.05 N sodium hydroxide specified in the directions for preparing its test solution, or with the equivalent of 0.02 N sodium hydroxide. After solubilization of the indicator, dilute the solution with carbon dioxide-free water to 200 mL (final concentration 0.05%). Store the solution in suitably resistant containers, protected from light.

3. pH RANGE AND COLOR CHANGE FOR SOME USEFUL INDICATORS

Indicator	pH Range	Color Change
Malachite green oxalate	0.0–2.0	yellow–green
Thymol blue	1.2–2.8	red–yellow
Quinaldine red	1.4–3.2	colorless–red
Methyl yellow	2.9–4.0	red–yellow
Bromophenol blue	3.0–4.6	yellow–blue
Methyl orange	3.2–4.4	pink–yellow
Bromocresol green	4.0–5.4	yellow–blue
Methyl red	4.2–6.2	red–yellow
Bromocresol purple sodium salt	5.0–6.8	greenish yellow–purple-violet
Bromocresol purple	5.2–6.8	yellow–purple
Bromothymol blue	6.0–7.6	yellow–blue
Phenol red	6.8–8.2	yellow–red
Neutral red	6.8–8.0	red–orange
Cresol red	7.2–8.8	yellow–red
Thymol blue	8.0–9.2	yellow–blue
Thymolphthalein	8.6–10.0	colorless–blue
Phenolphthalein	8.0–10.0	colorless–red
p-Naphtholbenzein	8.8–10.0	orange–green
Nile blue hydrochloride	9.0–13.0	blue–pink

Alphazurine 2G—Use a suitable grade.

Azo Violet [*4-(p-Nitrophenylazo)resorcinol*], $C_{12}H_9N_3O_4$—**259.22**—Red powder. It melts at about 193°, with decomposition.

Bismuth Sulfite—Use a suitable grade.

Brilliant Green—See *Brilliant Green* in the section *Reagents*.

Brilliant Yellow (*C.I. 24890*), $C_{26}H_{18}N_4Na_2O_8S$—**592.49**—Orange to rust-colored powder. Soluble in water.

LOSS ON DRYING ⟨731⟩: Dry it in vacuum at 60° for 1 hour: it loses not more than 5% of its weight.

Bromocresol Blue—Use *Bromocresol Green*.

Bromocresol Green (*Bromocresol Blue; Tetrabromo-m-cresolsulfonphthalein*), $C_{21}H_{14}Br_4O_5S$—**698.01**—White or pale buff-colored powder. Slightly soluble in water; soluble in alcohol and in solutions of alkali hydroxides. Transition interval: from pH 4.0 to 5.4. Color change: from yellow to blue.

Bromocresol Green Sodium Salt—Use a suitable grade.

Bromocresol Purple (*Dibromo-o-cresolsulfonphthalein*), $C_{21}H_{16}Br_2O_5S$—**540.22**—White to pink, crystalline powder. Insoluble in water; soluble in alcohol and in solutions of alkali hydroxides. Transition interval: from pH 5.2 to 6.8. Color change: from yellow to purple.

Bromocresol Purple Sodium Salt, $C_{21}H_{15}Br_2O_5SNa$—**562.20**—Black powder. Soluble in water. Transition interval: from pH 5.0 to 6.8. Color change: from greenish yellow to purple-violet.

MELTING RANGE ⟨741⟩: between 261° and 264°.

Bromophenol Blue (*3′,3″,5′,5″-Tetrabromophenolsulfonphthalein*), $C_{19}H_{10}Br_4O_5S$—**669.96**—Pinkish crystals. Insoluble in water; soluble in alcohol and in solutions of alkali hydroxides. Transition interval: from pH 3.0 to 4.6. Color change: from yellow to blue.

Bromophenol Blue Sodium—The sodium salt of 3′,3″,5′,5″ (*Tetrabromophenolsulfonphthalein*), $C_{19}H_9Br_4O_5SNa$—**646.36**—Pinkish crystals. Soluble in water and in alcohol. Transition interval: from pH 3.0 to 4.6. Color change: from yellow to blue.

Bromothymol Blue (*3′,3″-Dibromothymolsulfonphthalein*), $C_{27}H_{28}Br_2O_5S$—**624.38**—Cream-colored powder. Insoluble in water; soluble in alcohol and in solutions of alkali hydroxides. Transition interval: from pH 6.0 to 7.6. Color change: from yellow to blue.

Congo Red—See *Congo Red* in the section *Reagents*.

Cresol Red (*o-Cresolsulfonphthalein*), $C_{21}H_{18}O_5S$—**382.43**—Red-brown powder. Slightly soluble in water; soluble in alcohol and in dilute solutions of alkali hydroxides. Transition interval: from pH 7.2 to 8.8. Color change: from yellow to red.

Crystal Violet (*Hexamethyl-p-rosaniline Chloride*), $C_{25}H_{30}ClN_3$—**407.98**—Dark-green crystals. Slightly soluble in water; sparingly soluble in alcohol and in glacial acetic acid. Its solutions are deep violet in color.

SENSITIVENESS: Dissolve 100 mg in 100 mL of glacial acetic acid, and mix. Pipet 1 mL of the solution into a 100-mL volumetric flask, and dilute with glacial acetic acid to vol-