

## Appendix 2 Specifications of Processing Aids

Solvent:

(1) Propylene Glycol

Chemical formula:  $C_3H_8O_2$

Formula weight: 76.10

1. Description: Viscous, colorless liquid which is nearly odorless but possesses a bitter or sweet taste.
2. Specific gravity: 1.036~1.040.
3. Boiling point: 183~195°C.
4. Free acid: Add 1 mL of phenolphthalein TS to 50mL of water, then add 0.01N sodium hydroxide until the solution remains pink more than 30 seconds. Then add 10 mL of Propylene Glycol and 0.2 mL .1N sodium hydroxide the pink color returns and remains more than 30 seconds.
5. Chloride: Not more than 70 ppm max (As Cl).
6. Heavy metal: 5 ppm max (As Pb ).
7. Glycerol and ethylene glycol: Accurately weigh a sample 1g and add water to 1000mL. Take 13 mL sample solution and add 0.2g potassium iodide, 1 mL sulfuric acid and 50 mL water. Distil at a rate of 3~5mL per minute until the residual liquid is about 1 mL (the acceptor of the distillate should be placed in ice water). Add water to the distillate to 500mL. Take 1 mL of it with 0.1 g of chromic acid and 5 mL of sulfuric acid. Heat in a water bath for 30 minutes and then cool it down. Add water to make it 250mL. The liquid color shall not be denser than that of 1 mL of formaldehyde standard solution after the same operation.
8. Residue on ignition: Not more than 0.05 % .

(2) Glycerol

Chemical formula:  $C_3H_8O_3$

Formula weight: 92.10

1. Assay: Not less than 95.0%.
2. Identification: Add 2~3 drops of this product are heated in the presence of 0.5 g potassium hydrogen sulfate, acrolein will be formed, which has an unpleasant odor.
3. Description and Solubility: Clear, colorless, odorless or with mild odor, hygroscopic, syrupy liquid with sweet taste. Miscible with water and ethanol; insoluble in chloroform, ether and petroleum.
4. pH: The aqueous solution of this product should be neutral.
5. Specific gravity: 1.250~1.264.
6. Chloride: Not more than 0.003% (calculated as Cl ).
7. Arsenic: Not more than 4 ppm (calculated as  $As_2O_3$ ).
8. Heavy metal: Not more than 5 ppm (calculated as Pb ) .
9. Fatty acid and fatty acid ester: Not more than 0.1% max (As butyric acid).

10. Acrolein, glucose and ammonium salt: Heat a mixture of 5 mL of sample and 5 mL of potassium hydroxide solution (1 in 10) at 60°C for 5 minutes. It neither becomes yellow nor emits an odor of ammonia.
11. Residue on ignition: Not more than 0.01% (800±25°C, to constant weight).

(3) Hexane

Chemical formula: This product mainly contains n-Hexane, C<sub>6</sub>H<sub>14</sub>.

1. Description: Colorless, very volatile liquid with gasoline-like odor.
2. Specific gravity: 0.659~0.685.
3. Refractive index:  $n_D^{20}=1.374\sim 1.386$ .
4. pH: After 30 mL of sample is mixed 10 mL with water and fully shaken, the separated water layer should be neutral.
5. Sulfide: Add 3 mL of silver ammonium nitrate test solution to 5 mL of sample. Fully shake and heat at 60 °C under dark for 5 minutes in a dark place, it should not be brown.
6. Readily carbonizable substance: Add 5 mL of sulfuric acid to 5 mL of sample. When fully mixed for 5 minutes, the liquid color of the sulfuric acid layer shall not be denser than that of mixture B.
7. Benzene: not more than 0.25 v/v % .
8. Distillation range: 95% v/v distils between 64 to 70°C.
9. Residual on evaporation: Not more than 13 ppm(105 °C, 30 minutes).

(4) Isopropyl Alcohol (Isopropanol)

Synonyms: 2-Propanol; propan-2-ol

Chemical formula: C<sub>3</sub>H<sub>8</sub>O

C.A.S. No. 67-63-0

Formula weight: 60.10

1. Assay: C<sub>3</sub>H<sub>8</sub>O not less than 99.5%.
2. Description: Colorless liquid compound with a strong odor.
3. Solubility: Miscible with water, ethanol, ether, and other organic solvent.
4. Specific gravity:  $d_{20}^{20}$ : 0.784-0.788.
5. Refractive index:  $n_D^{20}$ : 1.377-1.380.
6. Water: Not more than 0.2% (Karl Fischer Method).
7. Distillation range: Should not exceed 1°C and should include 82.3 °C.
8. Non-volatile residue: Not more than 2 mg/100 mL.
9. Acidity: Not more than 0.002% max (calculated as acetic acid).
10. Other alcohol, ether and volatile impurities: Not more than 0.5 wt% total, with not more than 0.1% of any single ethers.
11. Lead: Not more than 1 mg/kg.

(5) Acetone

Synonyms: Dimethylketone; propanone; propan-2-one

Chemical formula: C<sub>3</sub>H<sub>6</sub>O

CAS No. 67-64-1

Formula weight: 58.08

1. Assay: Not less than 99.5% min (w/w).
2. Description: Colorless, volatile, flammable liquid with a special odor and no precipitation or suspended matter.
3. Solubility: Miscible with water and ethanol in any ration.
4. Specific gravity:  $d_{20}^{20}$ : 0.790-0.793.
5. Refractive index:  $n_D^{20}$ =1.358 -1.360.
6. Distillation range: 55.5 -57.0 °C
7. Non-volatile residue: Not more than 0.001% w/w.
8. Acidity: Not more than 0.002% w/w max (calculated as acetic acid).
9. Phenol: Not more than 0.001% w/w.
10. Readily oxidizable substance: 30 ml of the sample does not discolour 0.1 ml of 3% m/v freshly prepared aqueous potassium permanganate solution when shaken and allowed to stand at 20°C for 15 min.

(6) Ethyl Acetate

Synonyms: Acetic acid ethyl ester; ethyl ethanoate

Chemical formula:  $C_4H_8O_2$

CAS No. 141-78-6

Formula weight: 88.11

1. Assay: 99.0% min.
2. Description: Clear colorless liquid with a fruity odor.
3. Specific gravity:  $d_{25}^{25}$ : 0.894-0.901.
4. Refractive index:  $n_D^{20}$ : 1.371-1.376.
5. Acid value: Not more than 5.0.
6. Boiling point: 77 °C.

(7) Triacetin

Synonyms: Glyceryl triacetate

Chemical formula:  $C_9H_{14}O_6$

CAS No. 102-76-1

Formula weight: 218.21

1. Assay: No less than 98.5% (calculated on the anhydrous basis).
2. Description: Colorless somewhat oily liquid with a slightly fatty odor.
3. Solubility: Slightly soluble in water, miscible with ether.
4. Test for glycerol: Heat a few drops of this product in a test tube with about 0.5 g of potassium bisulfate. Pungent vapors of acrolein are evolved.
5. Test for acetate: The solution prepared for the content analysis test shows positive reaction of acetic ions.
6. Water content: Not more than 1.0% (Karl Fischer Method).
7. Refractive index: 1.429-1.431(25 °C) .
8. Specific gravity:  $d_{25}^{25}$ : 1.154-1.158.

9. Distillation range: 258-270 °C.
10. Sulfated ash: Not more than 0.02%.
11. Acidity: Accurately weigh a sample of 25 g, dilute with 50 ml of neutralized ethanol, and add 5 drops of phenolphthalein TS. Not more than 1 ml of 0.02N sodium hydroxide is required to produce a pink color.
12. Unsaturated compound: To 10 ml of the sample in a glass-stoppered tube add, dropwise, a solution of bromine in carbon tetrachloride (1 mL in 100ml) until a permanent yellow color is produced. No turbidity or precipitate appears after 18 hours in the dark.
13. Lead: Not more than 2 mg/kg.