

**Recovery of Asphalt Cement from Solution by Abson or Rorovapor**

LS-284/D-1856/D5404

EQUIPMENT

ABSON RECOVERY

1. EXTRACTION EQUIPMENT - SEE LS-282 (**Reflux not allowed**)? .....
2. CYLINDER: Carbon dioxide gas with pressure reducing valve? .....
3. VARIABLE ELECTRICAL TRANSFORMERS? .....
4. ELECTRICAL HEATING MANTLE (2000 ml capacity)? .....
5. ELECTRICAL HEATING MANTLE (500 ml capacity)? .....
6. BOILING FLASK (2000 ml capacity; round bottom with standard taper joints 24/40? .....
7. DISTILLING FLASK (500 ml capacity, 2 neck with standard taper joints (24/40 and 34/45 sizes)? .....
8. SUPPORT STAND (large)? .....
9. RING SUPPORT (for 2000 ml capacity heating mantle with clamp)? .....
10. RING SUPPORT (for 500 ml capacity heating mantle with clamp)? .....
11. GAS FLOWMETER (10-1900 ml-min air flow capacity)? .....
12. GAS FLOWMETER SHIELD? .....
13. FIBERGLASS MUFFLERS (to fit over distillation flasks)? .....
14. TRICHLOROETHYLENE (certified A.C.S. grade)? .....
15. GAS MANIFOLD (with regulating valve(s) for CO<sub>2</sub> control)? .....
16. CONDENSER (Graham with jacket length 200 mm minimum)? .....
17. GRADUATED CYLINDERS (Either 500 ml or 2000 ml)? .....
18. FLASKS (flat bottom, long neck, 2000 ml capacity for recovery of bitumen solution from extraction and trichloroethylene from primary distillation and 250 ml capacity for recovery of solvent from the secondary distillation)? .....
19. BOILING CHIPS? .....
20. GLASS CONNECTING TUBES (6.4 mm inside diameter)? .....
21. RUBBER TUBING (6 mm inside diameter for condenser)? .....
22. CENTRIFUGE BOTTLES (250 ml capacity)? .....
23. GLASS OR PLASTIC FUNNEL (100 mm diameter)? .....
24. AERATION TUBE (copper, 4 mm inside diameter, 200 mm long with bottom cut at 45°)? .....
25. PLASTIC TUBING (6.4 mm inside diameter for gas distribution)? .....
26. CORK STOPPERS (for both size distillation flasks)? .....
27. THERMOMETER (ASTM 7C, range -2 to 300°C conforming to requirements of ASTM E1? .....

ROTAVAPOR RECOVERY

1. ROTAVAPOR: equipped with distillation flask, variable speed motor capable of 50rpm, condenser, solvent recovery flask and heated oil bath. Angle of distillation ~15°. Distillation flask at full depth of immersion approximately 38 mm? .....
2. WATER BATH? .....
3. COLD TRAP? .....
4. MANOMETER, GAUGE OR PRESSURE CONTROL? .....
5. WOLFE BOTTLE (only if pressure controller is used in the system)? .....
6. GAS FLOWMETER (capable of indicating flow up to 1000 ml/min)? .....
7. VACUUM SYSTEM (capable of maintaining a pressure of ±0.5 mm (±0.02 in.) of the desired level up to and including 600 mm (23.6 in.) Hg)? .....

EQUIPMENT; (continued)

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- 8. NITROGEN GAS (cylinder fitted with pressure reducing valve)? .....
- 9. TRICHLOROETHYLENE (certified A.C.S. grade)? .....

RECOVERED ASPHALT CEMENT EQUIPMENT

- 1. BEAKER (glass, 30 ml capacity, for transfer of recovered bitumen to viscometer tube)? .....
- 2. PENETRATION CANS? .....
- 3. SCREEN (1.18 mm, 120 mm square)? .....
- 4. SCREEN (150 µm, 120 mm square)? .....

PROCEDURE

EXTRACTION

- 1. Field samples prepared for extraction as per: 7.1, 7.2, 7.3, 7.4,(Extraction) in LS-284.....
- 2. Carried out as in Rotarex procedure LS-282: **reflux not permitted?** .....
- 3. Carried out on two 1000 g batches of sample? .....

ABSON RECOVERY

- 1. Total extract samples transferred (staged) to the 2000 ml primary distillation flask? .....
- 2. Boiling chips added? .....
- 3. Fiberglass muffler placed over flask? .....
- 4. Solvent offtake rate controlled to a slow steady stream by variable transformer adjustment? .....
- 5. Approximately 200 ml distillation residue transferred to 500 ml flask? .....
- 6. Assemble secondary distillation apparatus? .....
- 7. Insert copper tube and thermometer through cork stopper ? .....
- 8. Thermometer adjusted to 6.4 mm above bottom of secondary distillation flask? .....
- 9. CO<sub>2</sub> tube set just above surface of liquid in flask? .....
- 10. Fiberglass muffler placed over flask? .....
- 11. Distillation started slowly? .....
- 12. Copper tube lowered into solution when liquid temperature reaches 115°C? .....
- 13. Gas introduced at 100 ml/min? .....
- 14. Distillation rate maintained at 50 to 70 drops per minute? .....
- 15. Gradually increase gas flow to maximum 900 ml/min – offtake rate maintained? .....
- 16. Temperature maintained at 150°C for 20 minutes? .....
- 17. Residue poured through 1.18 mm screen? .....

ROTAVAPOR RECOVERY

- 1. Oil bath heated to 138° ± 2.8°C? .....
- 2. Cold water circulated through condenser? .....
- 3. Extract transferred to 2000 ml flask and flask fitted to rotation assembly? .....
- 4. Pressure lowered to 40 ± 0.5 mm Hg below atmospheric pressure? .....

PROCEDURE: continued

- 5. Nitrogen flow started at about 500 ml/min .....

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6. Flask lowered into the oil bath at minimum depth to control distillation rate?..... \_\_\_\_\_
  7. Flask lowered to recommended 38 mm depth into the oil bath?..... \_\_\_\_\_
  8. Pressure reduced to  $600 \pm 0.5$  mm Hg below atmospheric pressure? ..... \_\_\_\_\_
  9. Nitrogen flow rate maintained at about 600 ml/min? ..... \_\_\_\_\_
  10. Spin rate of flask adjusted to about 45 rpm? ..... \_\_\_\_\_
  11. After foaming subsides pressure reduced to minimum (maximum vacuum)? ..... \_\_\_\_\_
  12. Condition maintained for 15 min? ..... \_\_\_\_\_
  13. Pressure returned to atmospheric and flask removed, neck covered with aluminum foil?..... \_\_\_\_\_
  14. Flask placed in an oven at  $163^{\circ}\text{C}$  for  $30 \pm 1$  min? ..... \_\_\_\_\_
  15. Flask removed from oven, neck wiped clean and residue transferred to appropriate container?..... \_\_\_\_\_

COMMENTS:

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Inspector: \_\_\_\_\_ Inspection No: \_\_\_\_\_