

Cold Solvent Parts Washer PTE Template

Equipment: One Parts Washer with a secondary reservoir and a surface opening 2 inches in diameter that contains mineral spirits. This blend of mineral spirits does not contain HAPs.

Calculations:

Parts Washer:

For VOC calculations: $q = A \times [Pa \times Mw / RT] [Di / (Z2 - Z1)] \times \ln[1 / (1 - Y_{ci})] [EM]$

$$Pa = (\text{atmospheric pressure}) = 760 \text{ mmHg} = 100 \times 10^3 \text{ N/m}^2$$

$$R = (\text{Ideal Gas Constant}) = 8.314 \times 10^3 \text{ J/kmol} \cdot \text{K}$$

$$T = (\text{liquid temperature}) = 293.15 \text{ K}$$

$$Z2 - Z1 = \text{empty vapor space above the liquid level in the tank} = 0.001 \text{ m}$$

$$EM = 1.1 = 10\% \text{ increase of the emissions to include working losses (i.e. slashing, etc)}$$

$$Mw = \text{molecular weight} = 99 \text{ kg/kmol}$$

$$Di = \text{Diffusivity of component through air} = 0.62 \times 10^{-5} \text{ m}^2/\text{s} \text{ for mineral spirits}$$

$$Y_{ci} = \text{volatile fraction of components in air} = \text{vapor pressure} / 760 \text{ mmHg} \\ = 0.6 \text{ mmHg} / 760 \text{ mmHg} \\ = 0.000789$$

$$A = \text{surface area} = (\pi \times \text{radius}^2) = 3.14 \times (1 \text{ in})^2 = 3.14 \text{ in}^2$$

$$3.14 \text{ in}^2 \times (1 \text{ ft} / 12 \text{ in})^2 = 0.02 \text{ ft}^2 \text{ for a secondary reservoir}$$

PTE for VOC:

Parts Washer:

$$q = (0.02 \text{ ft}^2 \text{ surface area}) (1 \text{ m}^2 / 10.76 \text{ ft}^2) [(100 \times 10^3 \text{ N/m}^2) \times (99 \text{ kg/kmol}) / (8.314 \times 10^3 \\ \text{ J/kmol} \cdot \text{K}) (293.15 \text{ K})] [(0.62 \times 10^{-5} \text{ m}^2/\text{s}) / (0.001 \text{ m})] \ln[1 / (1 - 0.000789)] [(3600 \text{ s/hr}) (2.2046 \\ \text{ lb/kg}) (8760 \text{ hr/yr}) / (2000 \text{ lb/ton})] [1.1] = 0.0014 \text{ tpy}$$

Total = 0.0014