



Find solutions for your homework

Search

home / study / engineering / mechanical engineering / mechanical engineering questions and answers / two liquids of different densities (r1 = 150...

## Question: Two liquids of different densities (r1 = 1500 kg/m<sup>3</sup> , r2 = 500 k...

(3 bookmarks)

Two liquids of different densities (r1 = 1500 kg/m<sup>3</sup> , r2 = 500 kg/m<sup>3</sup> ) are poured together in a 100 liter tank, filling it. If the resulting density of the mixture is 800 kg/m<sup>3</sup> , find the respective amounts of liquids used. Also, find the weight of the mixture; local g = 9.675 m/s<sup>2</sup> .

### Expert Answer

Was this answer helpful?



### General guidance

Show more ▾

### Step-by-step

FIRST STEP | ALL STEPS | ANSWER ONLY

Step 1 of 3 ^

Write the expression for total volume ( $V$ ).

$$V = V_1 + V_2$$

$$V_2 = V - V_1 \dots\dots (1)$$

Here, volume of liquid 1 is  $V_1$  and volume of liquid 2 is  $V_2$ .

Calculate the total mass ( $m$ ) present in the tank.

$$m = m_1 + m_2$$

Here, mass of liquid 1 is  $m_1$  and mass of liquid 2 is  $m_2$ .

Substitute  $\rho V$  for  $m$ ,  $\rho_1 V_1$  for  $m_1$  and  $\rho_2 V_2$  for  $m_2$ .

$$\rho V = \rho_1 V_1 + \rho_2 V_2$$

Substitute  $(V - V_1)$  for  $V_2$ .

$$\rho V = \rho_1 V_1 + \rho_2 (V - V_1)$$

$$\rho V = \rho_2 V + V_1 (\rho_1 - \rho_2)$$

$$V_1 = \frac{V(\rho - \rho_2)}{(\rho_1 - \rho_2)}$$

Substitute 100 lit for  $V$ , 800 kg/m<sup>3</sup> for  $\rho$ , 1500 kg/m<sup>3</sup> for  $\rho_1$  and 500 kg/m<sup>3</sup> for  $\rho_2$ .

$$V_1 = \frac{100 \text{ lit} (800 \text{ kg/m}^3 - 500 \text{ kg/m}^3)}{(1500 \text{ kg/m}^3 - 500 \text{ kg/m}^3)}$$

$$= 30 \text{ lit}$$

The volume ( $V_1$ ) of liquid 1 used is 30 lit.

**Explanation** | Common mistakes | Hint for next step

The relation between the mass, density and volume is used to determine the volume of liquid 1 used.

### Post a question

Answers from our experts for your tough homework questions

Enter question

### Continue to post

18 questions remaining



### Snap a photo from your phone to post a question

We'll send you a one-time download link

888-888-8888

Text me

By providing your phone number, you agree to receive a one-time automated text message with a link to get the app. Standard messaging rates may apply.

### My Textbook Solutions



Marketing Channels  
8th Edition



Environmental Science  
15th Edition



Cengage Advantage...  
9th Edition

[View all solutions](#)



rewrite the equation (1),

$$V_2 = V - V_1$$

Substitute **30 lit** for  $V_1$  and **100 lit** for  $V$ .

$$\begin{aligned} V_2 &= 100 \text{ lit} - 30 \text{ lit} \\ &= 70 \text{ lit} \end{aligned}$$

The volume ( $V_2$ ) of liquid 2 used is **70 lit**.

**Explanation** | Hint for next step

The volume ( $V_2$ ) of liquid 1 used is substituted in Equation (1) to calculate the volume of liquid 2 used.

Step 3 of 3 

Calculate the total weight ( $W$ ) of the mixture.

$$\begin{aligned} W &= mg \\ &= \rho Vg \end{aligned}$$

Substitute **800 kg/m<sup>3</sup>** for  $\rho$ , **100 lit** for  $V$  and **9.675 m/s<sup>2</sup>** for  $g$ .

$$\begin{aligned} W &= (800 \text{ kg/m}^3)(100 \text{ lit})(9.675 \text{ m/s}^2) \\ &= (800 \text{ kg/m}^3) \left( 100 \text{ lit} \left( \frac{1 \text{ m}^3}{10^3 \text{ lit}} \right) \right) (9.675 \text{ m/s}^2) \\ &= 774 \text{ N} \end{aligned}$$

The total weight ( $W$ ) of the mixture is **774 N**.

**Explanation**

The total weight of the mixture is calculated by multiplying the values of density, volume and acceleration due to gravity.

Answer

The volume ( $V_1$ ) of liquid 1 used is **30 lit**.

The volume ( $V_2$ ) of liquid 2 used is **70 lit**.

The total weight ( $W$ ) of the mixture is **774 N**.

### Questions viewed by other students

Q: A 30-m vertical column of fluid (density 1878 kg/m<sup>3</sup>) is located where  $g = 9.65 \text{ m/s}^2$ . Find the pressure at the base of the column.

A: [See answer](#) 100% (1 rating)

Q: 2. Two liquids of different densities ( $\rho_1 = 1500 \text{ kg/m}^3$ ;  $\rho_2 = 500 \text{ kg/m}^3$ ) are poured together into a 100-L tank, filling it. If the resulting density of the mixture is  $800 \text{ kg/m}^3$ , find the respective quantities of liquids used in liters. Also, find the weight of the mixture in N. Local  $g = 9.675 \text{ m/s}^2$

A: [See answer](#)

[Show more](#) 

LEGAL & POLICIES 

---

CHEGG PRODUCTS AND SERVICES 

---

CHEGG NETWORK 

---

CUSTOMER SERVICE 

---



© 2003-2021 Chegg Inc. All rights reserved.