ERRATA for

PE Chemical Practice Exam

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Errata posted 11-21-2017

Revisions are shown in red.

Solution 46, p. 91:

For the constant, adiabatic, and isothermal flow of an incompressible fluid, a form of the Bernouilli equation is:

$$\frac{P_1 \bullet g_c}{\rho_1 \bullet g} + \frac{v_1^2}{2g_c} + \frac{h_1 g}{g_c} + h_{pump} = \frac{P_2 \bullet g_c}{\rho_2 \bullet g} + \frac{v_2^2}{2g_c} + \frac{h_2 g}{g_c} + h_f$$

where h_f = friction head

h_{pump} = pump head

ρ = density

P = pressure

v = linear velocity of flow (ft/sec)

g_c = gravitational constant

If the change in velocity is negligible, the equation reduces to:

$$h_{pump} = \frac{P_2 \bullet g_c}{\rho_2 \bullet g} - \frac{P_1 \bullet g_c}{\rho_1 \bullet g} + \frac{(h_2 - h_1)g}{g_c} + h_f$$

$$= \frac{\left(14.7 \text{ lbf/in}^2\right)\left(144 \text{ in}^2/\text{ft}^2\right)\left(32.174 \frac{\text{lbm-ft}}{\text{lbf-sec}^2}\right)}{\left(62.4 \text{ lbm/ft}^3\right)(1.2)\left(32.174 \text{ ft/sec}^2\right)} - \frac{\left(74.7 \text{ lbf/in}^2\right)\left(144 \text{ in}^2/\text{ft}^2\right)\left(32.174 \frac{\text{lbm-ft}}{\text{lbf-sec}^2}\right)}{\left(62.4 \text{ lbm/ft}^2\right)\left(32.174 \text{ ft/sec}^2\right)}$$

$$+ 225 \text{ ft} + 25 \text{ ft} = 105.88 \text{ ft}$$

Converting,

$$h_{pump} = \frac{105.88 \text{ ft}\left(50 \text{ gal/min}\right)\left(0.13368 \text{ ft}^3/\text{gal}\right)\left(62.4 \text{ lbm/ft}^3\right)\left(32.174 \text{ ft/sec}^2\right)}{33{,}000 \text{ ft lbf/(min-hp)}\left(\frac{32.174 \text{ lbm-ft}}{\text{lbf-sec}^2}\right)} = 1.34 \text{ hp}$$

THE CORRECT ANSWER IS: A

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Solution 48, p. 93:

The solution should read as follows:

The brake horsepower for the pump (bhp) can be calculated from the total dynamic head (TDH) read from the pump curve, as follows:

$$\text{bhp} = \frac{Q(\text{TDH})\rho}{\eta_p}$$

where Q = volumetric flow rate
ρ = density of the fluid
η_p = efficiency of the pump

For 50 gal/min and a 9 1/2-in. impeller, from the pump curve, TDH = 82 ft and η_p is 0.29. Then:

$$\text{bhp} = \frac{\left(32.174\,\frac{\text{ft}}{\text{sec}^2}\right)(50\ \text{gal/min})(82\,\text{ft})(1.1)\left(62\ \text{lbm/ft}^3\right)}{\left(32.174\,\frac{\text{lbm-ft}}{\text{lbf-sec}^2}\right)\left(\frac{1\,\text{hr}}{60\,\text{min}}\right)\left(7.481\,\frac{\text{gal}}{\text{ft}^3}\right)\left(1.9800\text{E}6\,\frac{\text{ft-lbf}}{\text{hr-hp}}\right)(0.29)} = 3.93\,\text{hp}$$

THE CORRECT ANSWER IS: C