

Bio-Med Devices MVP-10 Competency

1. How do you set the pressure relief (pop-off) valve on the MVP-10 ventilator?
 - a. Set switch to 'cycle', then adjust pressure relief valve by turning Max Pressure knob and observing peak pressure obtained with each breath.
 - b. Turn flow to 12 lpm, occlude expiratory valve on circuit. Loosen bottom ring on pressure relief valve. Observe pressure on manometer and adjust valve accordingly.
 - c. Set switch to 'CPAP' and observe manometer while adjusting pressure relief valve up or down.

2. How do you set the respiratory rate on the MVP-10?
 - a. Select desired inspiratory time and either 1) turn vent to cycle and count rate for 15 seconds and multiply by 4, then adjust expiratory time accordingly to achieve correct rate (longer for decreased rate, shorter for increased rate). 2) Set according to the following formula
$$T_e = (60/\text{rate}) - T_i$$
 - b. Turn vent to 'Cycle' and adjust inspiratory time and expiratory time either way until the vent cycles at the correct rate.
 - c. Once an inspiratory time is selected, only certain rates are available, and the expiratory time must be set on one of the indicated values.

3. How do you set a peak pressure level in pressure limited ventilation?
 - a. It is not possible to set a peak pressure level.
 - b. With ventilator in 'Cycle' mode and flow turned on, adjust the pressure relief valve on the rear of the vent until desired pressure is observed on the manometer.
 - c. Make sure that the pressure relief valve is set above the desired peak pressure. With ventilator in 'Cycle' mode and patient circuit occluded, adjust Max Pressure knob until desired peak pressure is attained.

4. What is an indication that the set flow rate might be inadequate?
 - a. When a patient's spontaneous effort causes a negative deflection of the PEEP level on the manometer.
 - b. Flow will always be adequate when it is turned on.
 - c. When there is a honking sound coming from the exhalation valve.

5. Why does the circuit sometimes make a honking sound and how can I make it stop?
 - a. It is normal and cannot be quieted.
 - b. It is caused by the excess gas passing through the flow diverter of the exhalation valve. Remove the bottom portion of the exhalation valve.
 - c. This should never happen.

6. How can the MVP-10 be used as a volume limited ventilator?
 - a. It cannot. It is only a pressure limited ventilator
 - b. Changing the peak pressure will change the volume being delivered, but there is no way to know for sure what volume is set.
 - c. Volume is the product of the flow and the inspiratory time settings. Make sure the Max Pressure knob is not pressure limiting the breath and adjust volume by adjusting the flow level. Don't forget to allow for the volume lost in the circuit due to circuit compliance.

7. Since the vent is pneumatically powered, how much extra gas does it take to power the MVP-10?
 - a. 4 lpm.
 - b. It takes no extra gas.
 - c. 10 lpm.

MVP-10 Answers and Explanations

1. B The easiest way to adjust the pressure relief (pop-off) valve is to set the flow rate on the vent to 12 lpm and occlude the expiratory valve on the circuit. Loosen the bottom ring on the pressure relief valve and turn knob counter-clockwise to increase the pressure and clockwise to decrease the pressure. While observing manometer, adjust pressure to desired level. Alternatively, you may place the vent in the 'Cycle' mode, turn Max Pressure knob fully counter-clockwise (to max position), observe peak pressure level on manometer and adjust pressure relief valve as above.
2. A The ventilator breath rate is set by adjusting the expiratory time after the desired inspiratory time has been set. The proper expiratory times settings for a given rate can be determined using the following two methods: 1) Use the following formula: $T_e = (60/\text{rate}) - T_i$. For example, if you wanted to set the vent for an inspiratory time of 0.4 seconds and a rate of 40, you would set T_e to: $(60/40) - 0.4 = 1.1$. 2) The second method is to switch the vent to 'Cycle' mode and set the desired inspiratory time, then count the cycles for 15 seconds and multiply by 4. If you need a faster rate, decrease the expiratory time. If you need a slower rate, increase the expiratory time. Rates can be adjusted anywhere between 2-130.
3. C Verify the pressure relief setting by occluding the expiratory valve. Make sure the pressure relief valve is set higher than the desired peak pressure. Switch the vent to 'Cycle' mode. Adjust Max Pressure knob accordingly while observing the peak pressure displayed on the manometer: Counter-clockwise for a higher peak pressure and clockwise for a lower peak pressure.
4. A When a patient takes a spontaneous breath in between the ventilator's control breaths, if the PEEP level on the manometer drops below the desired set PEEP level, this could be an indication that the flow is inadequate. This could be because the patient's inspiratory effort is greater than the set flow rate. Increasing the flow rate should correct the problem.
5. B The exhalation valve releases excess gas through the bottom of the valve. Sometimes the cup (flow diverter) on the bottom of this valve can cause the gas noise to be amplified. The bottom of the valve can be removed to minimize the "honking" sound.
6. C Since volume is the product of inspiratory time x flow rate, the MVP-10 can be used as a volume ventilator by ensuring that the Max Pressure and pressure relief valve are not pressure limiting the breath and setting a specific flow rate to achieve a specific volume. Volume can be set by using the following two formulas: 1) First determine the flow rate multiplication factor by $60/\text{inspiratory time (in seconds)}$. 2) Then use this factor in the following formula:

$$\text{flow rate (lpm)} = \frac{\text{desired tidal volume (ml)} \times \text{multiplication factor}}{1000}$$

Don't forget to account for the volume lost due to circuit compliance.

7. A The ventilator is powered using 4 lpm over and above whatever total flow is indicated on the flow meters. If you want to calculate how long a tank might last while using the MVP-10, you can use the following formula:
$$\frac{\text{tank psi} \times \text{tank factor} = \text{duration in minutes}}{\text{set flow rate} + 4 \text{ lpm}}$$