

4 / INDOOR AIR QUALITY - Condensation, Mold & Formaldehyde

Your trailer was designed primarily for recreational use and short-term occupancy. If you expect to occupy it for an extended period, be prepared to deal with indoor air quality issues that you may encounter. These issues include condensation and high humidity, concentrations of formaldehyde and other airborne irritants, and biological pollutants. This chapter outlines some basic information about these air quality concerns and how you can minimize their effects on your RV lifestyle.

CONDENSATION AND EXCESSIVE HUMIDITY

The relatively small volume and tight compact construction of modern RVs means that the normal living activities of even a few occupants will lead to rapid moisture saturation of the air in the trailer and the appearance of visible moisture, especially in cold weather.

Just as moisture collects on the outside of a glass of cold water during humid weather, moisture can condense on the inside surfaces of the trailer during cold weather when the relative humidity of the interior air is high. This condition is increased because the insulated walls of your trailer are much thinner than house walls. Estimates indicate that every day a family of four can vaporize up to three gallons of water through breathing, cooking, bathing and washing.

During cold weather and even in short term occupancy, condensation often forms on ceiling vents and may even accumulate to the point of dripping onto the surface below. This is sometimes thought to be a “leaking” roof vent, but is most often condensation.

Unless the water vapor is carried outside by ventilation or condensed by a dehumidifier, it will condense on the inside of the windows and walls as moisture or in very cold weather as frost or ice. It may also condense out of sight within the walls or the ceiling where it will manifest itself as warped or stained panels. Appearance of these conditions may indicate a serious condensation problem. When you see signs of excessive moisture and condensation in the trailer, you should take action to minimize their effects.



Remember, your trailer is not designed, nor intended, for permanent housing. Use of the trailer for long-term or permanent occupancy may lead to premature deterioration of structure, interior finishes, fabrics, carpeting and drapes. Damage or deterioration due to long-term occupancy may not be considered normal and may, under the terms of the warranty, constitute misuse, abuse or neglect and may therefore reduce the warranty protection.

If you use a dehumidifier, please read and follow all manufacturer instructions and recommendations for use and cleaning. Be sure to empty and thoroughly clean the water collection container often.

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HOW TO REDUCE CONDENSATION PROBLEMS:

- Allow excess moisture to escape to the outside when bathing, washing dishes, hair-drying, laundering and using appliances and non-vented gas burners. Open windows and use the vent fans.
- Maintain interior relative humidity at 60% or below. In cold climates, relative humidity may need to be 35% or less to avoid window condensation. You can monitor relative humidity with a hygrometer. Hygrometers are available at building supply or some electronics stores.
- Always use the vent hood when cooking.
- Keep the bathroom door closed and the vent or window open when bathing and for a period of time after you have finished.
- Do not dry wet clothes or wet shoes in the trailer.
- In hot weather, start the air conditioner early as it removes excess humidity from the air while lowering the temperature.
- Keep the temperature as reasonably cool during cold weather as possible. The warmer the interior of the trailer, the more cold exterior temperatures and warm interior temperatures will contribute to creating condensation on interior surfaces. Avoid nighttime thermostat settings 10 or more degrees below your daytime settings. Drastic temperature reductions that reduce the indoor temperature quickly can increase the chance for moisture to condense on windows and other interior surfaces.
- Use a fan to keep air circulating inside the trailer so condensation and mildew cannot form in dead air spaces. Allow air to circulate inside closets and cabinets (leave doors partially open). Please keep in mind that a closed cabinet full of stored goods prevents circulation and allows the buildup of condensation.
- During cold weather, the natural tendency is to close up the trailer tightly. This will actually make the problem worse. You need to remove some of the warm air and allow some cool outside air to get inside the vehicle so the furnace will not recycle the humid interior air. Even when it's raining or snowing outside, the outside air will usually be dryer than the inside air.
- When cleaning floors and carpet, use the least amount of water necessary. Be sure to extract or dry any residual moisture thoroughly. If floors and carpet are cleaned before storing the trailer, be sure carpet is completely dry before closing up the trailer for an extended period.

- Keep the exterior shell of the trailer properly maintained. The shell includes the roof, side and end walls, windows, doors, compartments and exterior accessories, slideouts and under floor. Proper maintenance of sealants will help maintain a tight barrier against water intrusion. If you ever make modifications to your trailer, be sure any changes are done by a qualified service firm to minimize the possibility of moisture intrusion or accumulation problems later.
- Using your trailer in severe climates or weather conditions, such as extreme hot and humid or cold weather, will require extra care and maintenance to avoid moisture-related issues. In both extremely cold and hot/humid climates, you will need to pay more attention to controlling relative humidity inside the trailer. You may need to use a portable dehumidifier to manage the relative humidity within an acceptable range.

ABOUT MOLDS AND BIOLOGICAL CONTAMINANTS

WHAT ARE BIOLOGICAL CONTAMINANTS?

Biological contaminants include bacteria, molds, mildew, viruses, animal dander and saliva, house dust, mites, cockroaches, and pollen. There are many sources of these pollutants. Pollens originate from plants; viruses are transmitted by people and animals; bacteria are carried by people, animals, and soil and plant debris; and household pets are sources of saliva and animal dander. The protein in urine from rats and mice is a potent allergen. When it dries, it can become airborne.

Biological contaminants are, or are produced by, living things. Biological contaminants are often found in areas that provide food and moisture or water. For example, damp or wet areas such as cooling coils, humidifiers, condensate pans, or unvented bathrooms can be moldy. Draperies, bedding, carpet, and other areas where dust collects may accumulate biological contaminants. Contaminated air conditioning/heating systems can become breeding grounds for mold, mildew, and other sources of biological contaminants and can then distribute these contaminants throughout your RV. Many of these biological contaminants are small enough to be inhaled.

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By controlling the relative humidity level in a recreational vehicle, the growth of some sources of biologicals can be minimized. A relative humidity of 30-50 percent is generally recommended. Standing water, water-damaged materials, or wet surfaces also serve as a breeding ground for molds, mildews, bacteria, and insects. House dust mites, the source of one of the most powerful biological allergens, grow in damp, warm environments.

HEALTH EFFECTS FROM BIOLOGICAL CONTAMINANTS

Some biological contaminants trigger allergic reactions, including hypersensitivity pneumonitis, allergic rhinitis, and some types of asthma. Infectious illnesses, such as influenza, measles, and chicken pox are transmitted through the air. Molds and mildews release disease-causing toxins. Symptoms of health problems caused by biological pollutants include sneezing, watery eyes, coughing, shortness of breath, dizziness, lethargy, fever, and digestive problems. Children, elderly people, and people with breathing problems, allergies, and lung diseases are particularly susceptible to disease-causing biological agents in the indoor air.

Allergic reactions occur only after repeated exposure to a specific biological allergen. However, that reaction may occur immediately upon re-exposure or after multiple exposures over time. As a result, people who have noticed only mild allergic reactions, or no reactions at all, may suddenly find themselves very sensitive to particular allergens.

REDUCING EXPOSURE TO BIOLOGICAL CONTAMINANTS

- General good housekeeping, and maintenance of heating and air conditioning equipment, are very important. Adequate ventilation and good air distribution also help.
- Maintain the relative humidity between 30% - 60% to help control mold, dust mites, and cockroaches.
- Use the recommendations in the section on **Condensation and Excessive Humidity** to keep the humidity level down.
- Humidifiers can become breeding grounds for biological contaminants. They have the potential for causing diseases such as hypersensitivity pneumonitis and “humidifier fever.” Clean evaporation trays in air conditioners, dehumidifiers, and refrigerators frequently.

- Thoroughly clean and dry water-damaged carpets and building materials (within 24 hours if possible). Water-damaged carpets and building materials can harbor mold and bacteria. It is very difficult to completely rid such materials of biological contaminants.
- Avoid drying wet clothes inside.
- Keep the RV clean. Dust mites, pollens, animal dander, and other allergy-causing agents can be reduced, although not eliminated, through regular cleaning.
- Take steps to minimize biological pollutants in storage compartment and indoor closets and cabinets.

SPECIFICALLY ABOUT MOLDS ...

Molds are microscopic organisms that naturally occur in virtually every environment, indoors and out. Outdoors, mold growth is important in the decomposition of plants. Indoors, mold growth is unfavorable. Left unchecked, molds break down natural materials such as wood products and fabrics. Knowing the potential risks is important for any type of consumer to protect their investment.

WHAT FACTORS CONTRIBUTE TO MOLD GROWTH?

For mold growth to occur, the temperature must be between 40 degrees and 100 degrees Fahrenheit and there must be a source of moisture such as humidity, standing water, damp materials, etc. Indoors, the most rapid growth occurs with warm and humid conditions.

HOW CAN MOLD GROWTH BE INHIBITED?

By controlling relative humidity, the growth of mold and mildew can be inhibited. In warm climates, use of the air conditioner will reduce the relative humidity. Vents are located in the bathing and cooking areas and you should use them continuously during food preparation and bathing even during colder weather. Opening a window during these activities will assist in ventilation. In extremely humid conditions, using a dehumidifier can be helpful.

FURTHER INFORMATION ABOUT MOLDS

Frequent use of your trailer and keeping it clean are important preventive measures. Wipe up and dry any spills as soon as possible. Avoid leaving damp items lying about. Use mold or mildew-killing cleaning products where they can be safely used. Read the labels before using the product(s). Check sealants regularly and reseal when necessary to avoid water leaks. Proper preventive

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IMPORTANT NOTE
Chemical off-gassing is not a “defect” in your recreational vehicle. It is not covered under the one-year limited warranty. Please follow the recommendations in this section to address this concern.

maintenance to the trailer and its accessories, as described both in this manual and in accompanying literature, will help reduce the possibility of mold and mildew problems.

Dry any areas exposed to water leaks or spills as soon as possible and definitely within 24-48 hours. Quickly drying minimizes the chance for moisture damage and possible mold growth which can begin to form colonies in 48 hours. Since moisture is key to mold issues, treat all signs of condensation and spills seriously and deal with them promptly. Failure to deal with a moisture issue promptly may cause more severe problems where there weren't any before, or may make a small problem much worse.

Learn to recognize the signs of mold. Don't paint over suspicious discolorations until you are sure it is not mold. The affected surface must first be cleaned and dried. Any residual stains can be painted over.

Be sure to understand and eliminate the source of moisture accumulation as a part of the clean up. Clean up small amounts of mold as soon as it appears. Use a detergent/soap solution or an appropriate household cleaner. The cleaned area should be thoroughly dried. Dispose of any sponges or rags used to clean mold.

Several drying methods can be used:

- Remove excess water with an extraction vacuum
- Use a dehumidifier to aid drying
- Use portable fans to move air across the wet surfaces

CHEMICAL SENSITIVITY

After you first purchase your new RV and sometimes after it has been closed up for an extended period of time, you may notice some strong odors and feel some chemical sensitivity. *This is not a defect in your RV.* Many different products are used in the construction of your RV. Some of these materials such as carpet, linoleum, plywood, insulation, upholstery, may “off-gas” different chemicals. This off-gassing is especially noticeable when the materials are new or are exposed to high temperatures and/or humidity. Since your RV is much smaller than your home, and because the air inside the RV is exchanged less often, the concentration of these chemicals in your RV is more noticeable.

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Under some conditions, you may experience eye, nose, and throat irritation, and possibly headache, nausea, and a variety of asthma-like symptoms. Elderly persons and young children, as well as anyone with a history of asthma, allergies, or lung problems, may be more susceptible to the effects of these chemical emissions.

FORMALDEHYDE

Formaldehyde is an important chemical used widely by industry to manufacture building materials and numerous household products including some paints, coatings and cosmetics. It is also a by-product of combustion and certain other natural processes. It is used to add permanent-press qualities to clothing and draperies, as a component of glues and adhesives, and as a preservative in some products. Formaldehyde is also found in tobacco smoke, household products, and the use of un-vented, fuel-burning appliances. Thus, it may be present in substantial concentrations both indoors and outdoors.

As is standard in the industry, your MVP RV recreational vehicle incorporates wood products that were manufactured using formaldehyde. Formaldehyde has an important role in the adhesives use to bind together the components of certain wood products such as particleboard used as sub-flooring and shelving and in cabinetry and furniture; hardwood plywood paneling used for decorative wall covering and used in cabinets and furniture; and medium density fiberboard (MDF) used for drawer fronts, cabinets, and furniture tops. The wood products in your RV are designed to emit formaldehyde at or lower than the maximum levels allowable under standards issued by the Recreational Vehicle Industry Association, and should not produce symptoms such as irritation of the eyes and throat in most people.

Studies have shown that while almost all of the formaldehyde used in the materials in your RV is consumed during the manufacturing process, a small amount remains. This left-over formaldehyde dissipates over time, typically ranging over several months. The rate at which products like pressed wood or textiles release formaldehyde can change. Formaldehyde emissions will generally decrease as products age. When the products are new, high indoor temperatures or humidity can cause increased release of formaldehyde from these products.



Some parts of this recreational vehicle were made with products that contain urea-formaldehyde resin. As these products age they will release small quantities of formaldehyde. Formaldehyde can be irritating to the eyes and upper respiratory system of especially susceptible persons such as those with allergies or respiratory ailments. Proper ventilation will reduce indoor formaldehyde levels. If symptoms develop, consult a physician.

HEALTH EFFECTS OF FORMALDEHYDE

Formaldehyde is a colorless, pungent-smelling gas that can cause watery eyes, burning sensations in the eyes and throat, nausea, wheezing and coughing, fatigue, skin rash and difficulty in breathing in some people, and severe allergic reactions. High concentrations may trigger attacks in people with asthma. It has also been shown to cause cancer in animals and may cause cancer in humans.

In almost all cases, the human body is naturally equipped to handle formaldehyde without harm. If formaldehyde is absorbed into the body, naturally occurring enzymes in the blood stream convert it into a non-toxic substance that is eventually expelled as a bodily waste.

A very small percentage of the population, however, is more sensitive to formaldehyde. For these people, coming in contact with formaldehyde can cause watery or itchy eyes, runny or bleeding nose or sore throat. In most cases, these symptoms disappear with fresh air ventilation.

If you think you might have a sensitivity to formaldehyde, or if you have any questions or concerns about the health effects of formaldehyde, please consult your doctor or local health professionals.

HOW TO REDUCE EXPOSURE

To reduce or lessen your exposure to chemicals from off-gassing, you must ventilate your RV. Open windows, doors, exhaust vents frequently after purchase and whenever the temperature and/or humidity is high. Operate ceiling and/or other fans, roof air conditioner(s) and the furnace. Use a fan to force the stale air out and bring fresh air in.

- Use air conditioning and dehumidifiers to maintain moderate temperature and reduce humidity levels. Use the recommendations in this chapter on controlling moisture and humidity.
- Increase ventilation, particularly during the first few months after purchasing your RV.
- Do not smoke inside your RV. In addition to causing damage to your RV, tobacco smoke releases formaldehyde and other toxic chemicals.

If you use dehumidifiers to control humidity, be sure to drain and clean dehumidifier collection trays frequently so that they do not become a breeding ground for microorganisms. See the section on biological pollutants for more information.

ADDITIONAL INFORMATION ABOUT FORMALDEHYDE

- ***An Update on Formaldehyde: 1997 Revision (CPSC document #725).*** U.S. Consumer Product Safety Commission
- **American Lung Association**
1740 Broadway
New York, NY 10019-4374
(local ALA offices also have information)
- For further information on formaldehyde and consumer products, call the **EPA Toxic Substance Control Act (TSCA) Assistance Line (202) 554-1404.**

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