



The first step to creating a healthful home environment is to improve the quality of indoor air. Architect Bridget Puszka explains how many building materials contain toxic contaminants; awareness of what you can do to reduce these will greatly assist in improving health and preventing allergies.

Home Pollutant Health Check

Bridget Puszka

Let's face it, we spend most of our time indoors and the quality of indoor air has a significant impact on our health. Important health factors to consider with indoor building materials are: the rate and type of emissions, the degree of toxicity, the quantity involved, and the proximity to people. Emissions from materials are higher when they are new. New buildings and mobile homes have been identified as high-risk environments due to their exposure to emissions from building products. People have been known to become sick or sensitised after moving to newly built or renovated buildings.

Indoor Pollutants

Many of the materials we use to build, operate, furnish and maintain our indoor environments are sources of chemical contaminants. Examples of indoor chemical contaminants are:

- formaldehyde gas released by many glues, building materials and furnishings;
- carbon-monoxide gas produced from inadequately vented gas appliances;
- soil gases;
- volatile organic compounds from many cleaning products, hobbies and building materials;
- fibres from insulation and furnishing materials.

Toxic effects from these emissions can be acute (immediate), or chronic (long term). Some pollutants such as lead, radon or asbestos manifest their effects from long-

term exposure, while most airborne pollutants found indoors exert their effects from short-term exposure. The *Encyclopaedia Britannica* regards formaldehyde as a carcinogen. Some building materials have higher emission characteristics than others. For example, paints and adhesives have higher emissions than glass. The rate of emission from a product will increase with the temperature. Higher humidity can also lead to higher emissions as some materials have substances that are unstable to moisture, such as particle board.

Particle Board and MDF

Particle board and MDF (medium-density fibreboard) are manufactured wood products. Urea formaldehyde resin is commonly used in the manufacture of particle board and MDF. In the presence of water, such as high humidity in the air, urea formaldehyde will release formaldehyde. Laminates retard emissions from surfaces that are covered, however, emissions from particle board or MDF can escape from unfinished surfaces, including edges and holes. All surfaces have to be sealed with laminate, or a low toxicity acrylic sealant, to prevent the release of emissions.

Wet Applications

For materials that are installed wet, the emissions are greatest during application and the initial stages of curing and drying. Volatile emissions from paints, for example, decline rapidly within a few days or weeks. When painting, ensure there are no soft furnishings in the room to absorb

the chemicals during curing as they can be released at a later stage. Make sure the area is well ventilated, so exposure to harmful chemicals is greatly reduced. Once dry, emissions from paint diminish.

Quantity

Some materials are used in much greater quantities than others. Walls, floors, and ceilings make up the largest proportion of surfaces in a house. Large quantities of materials are used to cover these surfaces. Low emissions from large quantities of materials can result in high levels of chemicals in the air. When materials with significant emissions are used, the effects on indoor air quality can be substantial. Several materials may emit substances that, when combined, are greater than the sum of their individual effects. This is called a 'cocktail' effect.

Ventilation

Ventilation will dilute indoor pollutants but will not completely remove them. Maximising ventilation during the drying period of an application, when emissions are at their highest, will reduce exposure to the chemicals released. Making your house airtight by sealing cracks and upgrading insulation in walls, roofs and floors results in reduced air infiltration, sealing in the indoor pollutants and trapping contaminants.

Reduce or Eliminate

The best way to reduce indoor air pollutants is to avoid the materials that produce them. Eliminating the source of pollutants by substituting materials with the lowest possible emissions is the best way to improve indoor air quality. If the source can not be removed, then encapsulating it with a layer of polyurethane or epoxy resin will, when cured, seal in emissions. Consider including these materials and features when building or renovating:

- manufactured wood products that do not emit formaldehyde;
- solid hardwood for flooring, shelving and cabinet-making;
- interior finishes that have low-toxicity or water-based formulations;
- hard-finished flooring such as ceramic tiles or hardwood;
- fast drying paints, glues and mortars;
- low-emitting materials;
- a properly drained subfloor;
- good natural lighting.

Avoid:

- oil-based impregnation methods;
- fillers containing quick drying agents and fungicides;
- adhesives with SBR (styrene-butadiene-rubber) as a constituent;
- glues, varnishes and paints containing chemical additives;
- glued carpets;
- large surface area materials such as wall-to-wall carpet;
- synthetic carpets with underlays of PVC (polyvinyl chloride);
- hydrochloric acid on brick walls without heavy prewatering;
- uncovered mineral fibre, unfaced fibreglass insulation and other similar materials;
- concrete products containing plastic and high radon (blue shale) content;
- plastic surfaces on walls and floors;
- wallpapers, unless checked for out-gassing agents;
- products containing asbestos, biocides;
- materials containing formaldehyde.

In 1987 the number of different chemicals and synthetic substances used for building products was estimated to be over 5000. Since then, this figure has increased substantially as new building products come on to the market. For many substances, their potential long-term effects are unknown. Every building product has health and safety data sheets available from the manufacturer. These state the composition of the product and any known related health effects. The answer to reducing emissions from building products lies with product specification. The base ingredients, their combinations and environmental conditions all play a role in the emissions a building product will produce in the future. Building product manufacturers are aware of the health issues relating to emissions from their building products and are developing healthier products. In all cases the best recourse is to remove the source of the emission and replace it with a chemically stable low-emitting material.

Bridget Puszka runs an architectural design consultancy specialising in providing design solutions in energy efficient and low-allergy built environments. For further information contact BP Architects on 03-9776-7616.