Sick of chemicals: a review of the evidence
Chemicals have brought enormous benefits to society but research, such as the findings described in this booklet, are linking many of them to cancers, allergies and fertility problems. The European Union's draft legislation to regulate chemicals, called REACH, aims to protect health and the environment. But many scientific experts and NGOs feel the proposed legislation will not provide adequate protection from the health effects of harmful chemicals, or provide future generations with a planet that is not polluted with hazardous chemicals.

European countries must reduce dependency on chemicals that are harmful and replace them with safer substitutes.

This booklet shows only the tip of the iceberg in terms of evidence of the links between chemicals and health. It sets out some of the illnesses and conditions where there is «strong» or «good» evidence that chemicals contribute to ill health.

More research is emerging all the time and much of it shows that it is high time for legislators to act.
The chemicals and diseases mentioned in this booklet are taken from a database entitled, “Chemical Contaminants and Human Disease: A Summary of Evidence”, created by three leading scientists and medical doctors: Sarah Janssen; Gina Solomon; Ted Schettler.

The database links 200 human health conditions to different chemical contaminants by strength of evidence. Thirty-two examples of diseases where «strong» or «good» evidence exists have been selected for inclusion here. The full database is available at: http://www.protectingourhealth.org/corethemes/links/2004-0203spreadsheet.htm

Chemical Reaction and the European Public Health Alliance Environment Network acknowledge with thanks the permission given by the authors to use the data.
European Parliamentarians have a historic opportunity to respond to people’s concerns about the health effects of chemicals by voting for an improved REACH.

Representing millions of Europeans, non-governmental organisations, such as Chemical Reaction, European Public Health Alliance Environment Network, European Environmental Bureau, Friends of the Earth Europe and Greenpeace, have come together to define a clear and unified message.

The key demands of non-governmental groups to the European Parliament are:

- **Phase out the use of hazardous chemicals**
  Continued use should only be allowed if no safer alternatives are available or if their use is essential to society.

- **Strengthen registration procedures**
  The aim should be to close the gap that currently exists in terms of safety information about chemicals
produced in quantities of between one and 10 tonnes per annum.

- **Ensure independent quality audit**
  Ensure that industry information is independently audited for quality.

- **Subject all articles to the same information requirements**
  Require chemicals used in imported articles to undergo the same information requirements as those in EU-made articles, so as to protect consumers and avoid distortion of competition.

- **Make sufficient information publicly available**
  Full information on the chemicals contained in different products must be made available so that both retailers and consumers have the right to know and the right to choose what they purchase.
The light-hearted illustrations in the booklet show chemicals accumulating in our bodies, with sometimes irreversible effects. The booklet was produced by Chemical Reaction and the European Public Health Alliance Environment Network.
Chemical Reaction is a joint project on EU chemicals policy reform of the European Environmental Bureau, Friends of the Earth Europe and Greenpeace. Its aim is to provide a forum in which NGOs and citizens can become more involved in the relevant democratic decision making processes in the EU. Website: www.chemicalreaction.org

The European Public Health Alliance Environmental Network advocates protection of the environment as a means to improving the health and well being of European citizens, and brings together groups that want to ensure that health is at the centre of environment issues. These include NGOs specialising in public health, environment-related health conditions and associations representing health care professionals. Website: www.env-health.org

This publication has been made possible with the support of the Sigrid Rausing Trust.
Disease
Abnormal Sperm (morphology, motility, and sperm count)

«Strong» or «good» evidence links these chemicals:
- chlordecone
- dibromochloropropane (DBCP)
- excessive heat
- ethylene dibromide (EDB)
- ionizing radiation
- lead
- ethylene glycol ethers/acetates
- DES/estrogens
- PCBs
- pesticides (alachlor, atrazine, 2,4-D, benomyl, diazinon, gossypol)
- 2-bromopropane
- carbon disulfide
**Disease**

Acute Hepatocellular Injury (Hepatitis)

«**Strong**» or «**Good**» evidence links these chemicals:
ethanol, halothane, ionizing radiation; solvents: carbon tetrachloride, carbon tetrabromide, chloroform, dimethylformamide, tetrachloroethane, trichloroethylene (TCE); TNT; aflatoxins, mushroom toxins, bromobenzene, chlorinated naphthalenes, hexachlorobenzene, 2-nitropropane, paraquat, PCBs, phosphorus (yellow), phosphine, TCDD, trichloroethane
Disease
Attention Deficit Disorder/Attention Deficit Hyperactivity Disorder

«Strong» or «good» evidence links these chemicals

ethanol, PCBs, lead, tobacco smoke, manganese, organic solvents
Disease

Arrhythmias

«Strong» or «Good» evidence links these chemicals

carbon monoxide, chlorofluorocarbons (CFCs), pesticides: carbamates and organophosphates, cyanide, dihalomethanes, methylene chloride, organic nitrates, antimony, arsenic, arsine gas, ethyl bromide, isopropyl chloride, lead, methyl bromide; organic solvents (including acetone, benzene, carbon tetrachloride, carbon disulfide, chloroform, dichloroethylene, ethyl chloride, ketones, methyl chloride, methylene chloride, tetrachloroethylene (PCE), trichloroethane, trichloroethylene (TCE), toluene and xylene)
Disease

Asthma (allergic)

«Strong» or «good» evidence links these chemicals:

- Acid anhydrides, acrylates and methacrylates, amines (ethanolamines, ethylenediamine, paraphenylenediamine), animal antigens, captan, chlorothalonil, colophony, enzymes (amylase, papain, subtilase, egg lysosome, pepsin, trypsin), epoxy resins, fungal antigens, insect antigens, isocyanates, latex, metal fumes and salts (chromium, cobalt, nickel, platinum, tungsten carbide, vanadium, zinc carbide), plant pollens, plastic fumes and dusts (PVC, polyethylene, polypropylene), organic dusts (wood, grain, beans and fibers), aldehydes (acetaldehyde, acrolein, diesel engine exhaust, ozone, formaldehyde and propionaldehyde), aluminum, coal dust, diazotation salts, ethylene oxide, hexachlorophene, persulfate salts, phenol, pyrethins/pyrethroids, reactive dyes, sulfathiazole, tannic acid
Disease
Autoimmune Antibodies, positive antinuclear antibody (ANA)

«Strong» or «good» evidence links these chemicals

silica, asbestos, mercury, solvents (including benzene, carbon tetrachloride, formaldehyde, trichloroethane, trichloroethylene)
Disease
Bladder Cancer

«Strong» or «good» evidence links these chemicals

aromatic amines (4-aminobiphenyl, auramine, B-naphthalamine, benzidine, MOCA), benzidine-derived dyes, chlordimeform (and its metabolite 4-COT), coal tar, nitrobiphenyl, tobacco smoke, trihalomethanes (disinfection byproducts), arsenic, benzo(a)pyrene (PAH's), chlornaphazine, chlorphenol, ionizing radiation, methylene dianiline, organic solvents, o-toluidines
Disease
Breast Cancer

«Strong» or «good» evidence links these chemicals

- estrogens/DES
- ethanol
- ionizing radiation
- aromatic amines (B-naphthylamine and benzidine)
- ethylene oxide
- PAHs
- tobacco smoke
Disease
Bronchitis (chronic)

«Strong» or «good» evidence links these chemicals:
ammonia, aluminum, coal dust, cotton dust, isocyanates, metals (antimony, iron oxides, vanadium, osmium), oil mist, organic dusts (cotton, grain and wood dusts), particulate matter, portland cement, silica, smoke (tobacco smoke, fire smoke and engine exhaust), sulfur dioxide, grain dust, organic solvents, PCBs, phosgene, welding fumes
Disease

Cognitive Impairment
(includes impaired learning, impaired memory and decreased attention span)

«Strong» or «good» evidence links these chemicals

carbon disulfide, cocaine, ethanol, lead, methyl mercury, tobacco smoke/nicotine, carbon monoxide, nitrates, PCBs; pesticides (carbamates, methyl bromide, organochlorines, organophosphates); pentachlorophenol (PCP), toluene
Disease
Congenital Malformations (general)

«Strong» or «good» evidence links these chemicals
ethanol, ionizing radiation, arsenic, carbon monoxide, ethylene glycol ethers, mercury, organic solvents, tobacco smoke
Contact Dermatitis (allergic)

«Strong» or «good» evidence links these chemicals

antiseptics, aromatic amines, cement, colophony, cutting oils, dyes, formaldehyde, fragrances, glues and bonding agents, isothiazolins, lanolins, latex, metals, pesticides, potassium dichromate, preservatives, rubber products, rhus antigens
Disease
Contact Dermatitis (irritant)

«Strong» or «good» evidence links these chemicals

aminotriazole, abrasive dusts, chromic acid, cement, coal tars,
detergents/soaps, ethylene oxide, metal salts, mild acids/alkalis, pesticides,
solvents
Disease
Cirrhosis

«Strong» or «good» evidence links these chemicals
aflatoxins, ethanol, carbon tetrachloride, chloronaphthalenes, PCBs, tetrachloroethane, TNT, arsenic, halothane, organic solvents, trichloroethylene (TCE)
Disease
Developmental Delay

«Strong» or «good» evidence links these chemicals:
- ethanol
- lead
- methyl mercury
- nicotine/tobacco smoke
- PCBs
- organic solvents (toluene)
Disease
Fetotoxicity (miscarriage/spontaneous abortion; stillbirth)

“Strong” or “good” evidence links these chemicals

- Anesthetic gases
- Ethanol
- Ethylene glycol ethers
- Ionizing radiation
- Nicotine/tobacco smoke
- Trihalomethanes (disinfection byproducts)
- Arsenic
- Carbon monoxide
- DES
- Ethylene oxide
- Lead
- Methyl isocyanate
- Mercury
- Organic solvents (methylene chloride, trichloroethane, trichloroethylene (TCE), toluenes, xylenes, carbon disulfide, chloroform, formaldehyde, N-methyl pyrrolidone (NMP), tetrachloroethylene (PCE))
- Pesticides (dibromochloropropane (DBCP), fungicides (dithiocarbamates), organochlorines (DDT/DDE), paraquat, triazines)
**Disease**

Hepatocellular Cancer (liver cancer)

«**Strong**» or «**good**» evidence links these chemicals

aflatoxin B1, androgens, ethanol, hydrocarbons, arsenical pesticides, dimethylnitrosamine, PCBs, thorium dioxide (thorostat), trichloroethylene (TCE), vinyl chloride
Disease
Leukemias (adult-onset)

«Strong» or «good» evidence links these chemicals
benzene, ethylene oxide, ionizing radiation, arsenic, aromatic amines, 1,3-butadiene, carbon disulfide, dioxins/TCDD, chlorinated solvents [carbon tetrachloride, 1,2-dichloroethane]; pesticides (alachlor, DDT, phenoxyacetic herbicides); tobacco smoke
Disease
Leukemias (childhood)

«Strong» or «good» evidence links these chemicals

benzene, ionizing radiation, pesticides, metal dusts; chlorinated solvents: carbon tetrachloride, and trichloroethylene (TCE)
**Disease**
Lung Cancer

«Strong» or «good» evidence links these chemicals:
- aluminum, arsenic (including arsenical pesticides);
- asbestos, attapulgite,
- benzo(a)pyrene (PAH's), beryllium, cadmium, chloromethyl ethers, chromium, coal tars, diesel engine exhaust, ionizing radiation, mineral oils, mustard gas,
- nickel, radon, silica, soots, tobacco smoke, uranium, acid aerosols, acrylonitrile,
- aromatic amines, chlorophenols, coal dust, copper, dimethyl sulfate,
- formaldehyde, solvents, nitrosamines (NNK); PAHs (benz(a)anthracene, benzo(a)pyrene, dibenz(a,h) anthracene)
Disease
Lymphoma - Non-Hodgkin's

«Strong» or «good» evidence links these chemicals
dioxins (TCDD), aromatic amines, benzene, 1,3-butadiene, chlorophenols, creosote, ionizing radiation; organic solvents: carbon disulfide, carbon tetrachloride, trichloroethylene (TCE), tetrachloroethylene (PCE); PCBs, pesticides: carbamates (carbaryl), dicamba, fungicides (captan), organophosphates (dichlorovos, malathion), DDT, phenoxyacetic acid herbicides (2,4-D, MCPA, mecoprop)
Disease
Multiple Chemical Sensitivity

«Strong» or «good» evidence links these chemicals: pesticides, solvents, cleaning agents, fragrances, vehicle exhaust.
Disease
Myocardial Ischemia

«Strong» or «good» evidence links these chemicals:
carbon disulfide, carbon monoxide, cyanide, dihalomethanes, methylene chloride, organic nitrates, particulate air pollution, arsenic
Disease
Polymer Fume Fever

«Strong» or «good» evidence links these chemicals

Teflon pyrolysis products - polyvinyl fluoride, polytetrafluoroethylene
Disease
Porphyria (toxic)

«Strong» or «good» evidence links these chemicals:
ethanol, hexachlorobenzene, PAHs, PCBs, dioxins (TCDD), halothane, lead; methyl chloride, organic solvents (carbon tetrachloride, chloroform, paints, paint fumes, formaldehyde); pesticides: organochlorines (chlordane, DDT), organophosphates (diazinon) and phenoxy herbicides (2,4-D, 2,4,5-T); vinyl chloride
Disease
Prostate Cancer

«Strong» or «good» evidence links these chemicals

acrylonitrile, aromatic amines, cadmium, organic solvents, PAHs
Disease
Reduced Male Fertility (infertility and subfertility)

«Strong» or «good» evidence links these chemicals:
carbon disulfide, estrogens, ethylene glycol ethers, heat, ionizing radiation, lead; chlordecone, dibromochloropropane (DBCP), ethylene dibromide (EDB), cadmium, methylene chloride, radar, tetrachloroethylene (PCE), welding fumes.
Disease
Reduced Female Fertility (infertility and subfertility)

«Strong» or «good» evidence links these chemicals:
ionizing radiation, ethylene glycol ethers, formaldehyde, lead, nitrous oxide, organic solvents [tetrachloroethylene (PCE), toluene]; tobacco smoke
Disease
Scleroderma

«Strong» or «good» evidence links these chemicals
solvents (including: aromatic mixes, benzene, carbon tetrachloride, paint thinners/removers, trichloroethane, trichloroethylene (TCE), toluene, and xylene); vinyl chloride
Disease
Stomach Cancer

«Strong» or «good» evidence links these chemicals

asbestos, aromatic amines, chromium, coal dust, dioxins/TCDD, ethylene oxide, ionizing radiation, nickel, nitrates, organic solvents, phenoxyacetic herbicides
**Disease**

Steatosis (fatty liver)

«**Strong» or «good» evidence links these chemicals**
carbon tetrachloride, chloroform, ethanol, phosphorus, arsenic, halothane, hydrazine, hydrocarbons; organic solvents (chloroform, dimethylformamide, tetrachloroethane, trichloroethane, toluene); styrene, TNT
**Disease**

Thyroid Disorders (Hypothyroidism)

«Strong» or «good» evidence links these chemicals
cobalt, ionizing radiation, PBBs, PCBs, radioactive iodine, substituted phenols, thiocyanate, dioxins, ethylene thiourea (ETU), perchlorates, polybrominated diphenylethers (PBDEs)
To know more on how you might be exposed to the chemicals in your daily products and surroundings, see
http://www.greenpeaceweb.org/consumingchemicals/ddtest.asp
http://www.foe.co.uk/campaigns/safer_chemicals/

To find out how you can contact your legislator with your concerns on chemicals legislation, visit the Chemical Reaction website
http://www.chemicalreaction.org/ where information exists in 9 languages.

To learn more about other diseases which may be linked to chemicals, visit the database, Chemical Contaminants and Human Disease: A Summary of the Evidence at