Food additives are Organic substances that are intentionally added to food in small quantity during process. Food additives are chemicals added to Foods to keep them fresh or enhance their colour, flavour or texture. Many people view food additives as major threat. However, in terms of health risk, Food additives would come in at the end of the line after Food-borne micro-organisms inappropriate hygiene and eating habits. The manufacturers use additives, while some additives are harmless, others cause everything from hives and asthma to nausea and headaches in some people. List of some chemical additives and their possible side effects will help to decipher ingredient lists at supermarket.

**Keywords:** Monosodium glutamate, Tartrazine, Sodium benzoate, Aspartame unhygienic for human health.

**ABSTRACT**

Food additives are Organic substances that are intentionally added to food in small quantity during process. Food additives are chemicals added to Foods to keep them fresh or enhance their colour, flavour or texture. Many people view food additives as major threat. However, in terms of health risk, Food additives would come in at the end of the line after Food-borne micro-organisms inappropriate hygiene and eating habits. The manufacturers use additives, while some additives are harmless, others cause everything from hives and asthma to nausea and headaches in some people. List of some chemical additives and their possible side effects will help to decipher ingredient lists at supermarket.

In many parts of world food is being stored in houses of emergency in addition to basic food items, people also store frozen or preserved garden-grown fruits, vegetables & freezed dried products. Natural methods or preservation usually aim to exclude air, moisture & micro-organisms to provide environments in which organisms that might cause spoilage cannot survive. Natural way of the food preservation can be done by boiling, freezing, pasteurizing, dehydrating, smoking, pickling, adding sugar, sometimes sugar is combined with alcohol for preservation of luxury products such as fruit in brandy or other spirits, salt, alcohol, vinegar also oftened used as food preservatives. They are very efficiently drop the growth of bacterias in food, coffee powder & soup are dehydrated for preservation.

It is often the additives that are used to give a food marketable quality such as colour, that most commonly cause allergic reactions, some of this hypersensitive reactions includes:
- Digestive disorders: Diarrhoea & colicky pains
- Nervous disorders: Hyperactivity insomnia & irritability.
- Respiratory problems: Hives, itching, rashes & swelling.
- Skin problems: Hives, itching, rashes & swelling.

It is important to realize that many of the symptoms experienced as a result of food sensitivities can be caused by other disorders, medical diagnosis is important. If we try to diagnose, we may restrict our diet unnecessarily & neglect an illness.

(A) FLAVOUR ENHANCERS:

**Monosodium Glutamate:** Monosodium glutamate (MSG, also known as sodium glutamate) is the sodium salt of glutamic acid, one of the most abundant naturally occurring non-essential amino acids. Monosodium glutamate is found naturally in tomatoes, cheese and other foods.

<table>
<thead>
<tr>
<th>Properties(6)</th>
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</thead>
<tbody>
<tr>
<td>Chemical formula</td>
</tr>
<tr>
<td>Molar mass</td>
</tr>
<tr>
<td>Appearance</td>
</tr>
<tr>
<td>Melting point</td>
</tr>
<tr>
<td>Solubility in water</td>
</tr>
</tbody>
</table>

**IUPAC NAME:** Sodium 2-aminopentanedioate

**Harmful effects:** Monosodium glutamate (MSG) is a flavour enhancer commonly added to Chinese food, canned vegetables, soups and processed meats. The Food and Drug Administration (FDA) has classified MSG as a food ingredient that's "generally recognized as safe," but its use remains controversial. For this reason, when MSG is added to food, the FDA requires that it be listed on the label. It has been used as a food additive for decades. Over the years, the FDA has received many anecdotal reports of adverse reactions to foods containing MSG. These reactions — known as MSG symptom complex (7) — include:

- Headache, Flushing, sweating, Nausea.
- Facial pressure or tightness.
- Numbness and tingling or burning in the face, neck and other areas
- Rapid, fluttering heartbeats (heart palpitations), Chest pain
- Weakness

However, researchers have found no definitive evidence of a link between MSG and these symptoms. Researchers acknowledge, though, that a small percentage of people may have short-term reactions to MSG. Symptoms are usually mild and don't require treatment. The only way to prevent a reaction is to avoid foods containing MSG.

(B) FOOD COLOURINGS:

Tartrazine: Tartrazine is a synthetic lemon yellow azo dye primarily used as a food colouring. It is also known as E number E102, C.I. 19140, FD&C Yellow 5, Acid Yellow 23, Food Yellow 4, and trisodium 1-(4-sulfonatophenyl)-4-(4-sulfonatophenylazo)-5-pyrazolone-3-carboxylate). It is derived from coal tar Tartrazine is a commonly used colour all over the world, mainly for yellow, and can also be used with Brilliant Blue FCF (FD&C Blue 1, E133) or Green S (E142) to produce various green shades.

IUPAC name: Trisodium (4E)-5-oxo-1-(4-sulfonatophenyl)-4-[(4-sulfonatophenyl)hydrazono]-3-pyrazolecarboxylate

Other names: FD&C Yellow 5

<table>
<thead>
<tr>
<th>Properties</th>
<th></th>
</tr>
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<tbody>
<tr>
<td>Chemical formula</td>
<td>C₁₆H₉N₄Na₃O₉S₂</td>
</tr>
<tr>
<td>Molar mass</td>
<td>534.36 g·mol⁻¹</td>
</tr>
</tbody>
</table>

HARMFUL EFFECTS: Tartrazine has been banned in several countries (Austria, Norway) because of serious side effects such as causing (9)

- potentially lethal asthma attacks and nettle rash
- hives
- DNA damage
- Tumours of the thyroid
- ADHD - attention-deficit/hyperactivity disorder
- Other dangers of Tartrazine are anxiety attacks, itching, rhinitis, urticaria, general weakness, heatwaves, migraine, clinical depression, blurred vision, palpitations, feeling of suffocation, pruritus, purple skin patches and sleep disturbance. In rare cases,
Tartrazine side effects are noticeable even at minute doses and can last up to 72 hours after exposure.

Products containing tartrazine commonly include processed commercial foods that have an artificial yellow or green colour, or that consumers expect to be brown or creamy looking. It has been frequently used in the bright yellow colouring of imitation "lemon" filling in baked goods. It is widely used in deserts & sweets (ice cream, cotton candies), beverages, snacks, condiments & spreads (jam, jelly) and other processed foods.

(C) PRESERVATIVES:

Sodium Benzoate: Sodium benzoate is a substance which has the chemical formula \( \text{NaC}_7\text{H}_5\text{O}_2 \). It is a widely used food preservative, with an E number of E211.\(^{(15)}\) It is the sodium salt of benzoic acid and exists in this form when dissolved in water. It can be produced by reacting sodium hydroxide with benzoic acid.

\[
\text{O} \quad \text{O} \\
\text{Na} \\
\text{O} \quad \text{O} \quad \text{H}_5\text{C} \quad \text{O} \\
\text{N} \\
\text{A} \\
\text{C} \quad \text{H} \quad \text{N} \quad \text{O}_2
\]

IUPAC name: Sodium benzoate

Other names: E211, benzoate of soda

<table>
<thead>
<tr>
<th>Properties</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Chemical formula</td>
<td>( \text{C}_7\text{H}_5\text{NaO}_2 )</td>
</tr>
<tr>
<td>Molar mass</td>
<td>144.10 g·mol(^{-1})</td>
</tr>
<tr>
<td>Appearance</td>
<td>white or colourless crystalline powder</td>
</tr>
<tr>
<td>Odour</td>
<td>Odourless</td>
</tr>
<tr>
<td>Density</td>
<td>1.497 g/cm(^3)</td>
</tr>
<tr>
<td>Melting point</td>
<td>410 °C (770 °F; 683 K)</td>
</tr>
<tr>
<td>Solubility</td>
<td>soluble in water, liquid ammonia, pyridine.</td>
</tr>
</tbody>
</table>

Harmful effects: Sodium benzoate is often added to milk and meat products, these preservatives are used in many foods, including drinks, low-sugar products, cereals and meats.
Both temporarily inhibit the proper functioning of digestive enzymes and cause headache, stomach upset, asthma, attacks & hyperactivity in children. It may trigger or exacerbate symptoms or episodes of attention-deficit/hyperactivity disorder or ADHD. The condition is most common in children but it can be present in adults as well, and affected individuals may be forgetful, have difficulty concentrating and following directions or display impulsiveness.

(C) ARTIFICIAL SWEETNER:

Aspartame: Aspartame is an artificial, non-saccharide sweetener used as a sugar substitute in some foods and beverages. Aspartame is a methyl ester of the aspartic acid/phenylalaninedipeptide.

IUPAC name: Methyl L-α-aspartyl-L-phenylalaninate

Other name :N-(L-α-Aspartyl)-L-phenylalanine,1-methyl ester

<table>
<thead>
<tr>
<th>Chemical formula</th>
<th>C_{14}H_{18}N_{2}O_{5}</th>
</tr>
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<tbody>
<tr>
<td>Appearance</td>
<td>White crystalline</td>
</tr>
<tr>
<td>Molar mass</td>
<td>294.31 g·mol(^{-1})</td>
</tr>
<tr>
<td>Density</td>
<td>1.347 g/cm(^3)</td>
</tr>
<tr>
<td>Melting point</td>
<td>246 to 247 °C (475 to 477 °F; 519 to 520 K)</td>
</tr>
<tr>
<td>Boiling point</td>
<td>Decomposes</td>
</tr>
<tr>
<td>Solubility</td>
<td>Sparingly soluble in water &amp; Slightly soluble in ethanol</td>
</tr>
<tr>
<td>Acidity (pK(_a))</td>
<td>4.5–6.0</td>
</tr>
</tbody>
</table>
**HARMFUL EFFECTS:** Activists claim there’s a link between aspartame and a multitude of ailments, including: (12)

1. Cancer  
2. Seizures  
3. Headaches  
4. Depression  
5. Attention deficit disorder  
6. Dizziness  
7. Weight gain  
8. Birth defects

**D) PIGMENTS:**

**Canthaxanthin:** Canthaxanthin is a [keto-carotenoid](#) pigment widely distributed in nature. [Carotenoids](#) belong to a larger class of phytochemicals known as [terpenoids](#). The chemical formula of canthaxanthin is C_{40}H_{52}O_{2}. It was first isolated in edible mushrooms. It has also been found in green algae, bacteria, crustaceans, and bioaccumulates in fish such as carp, golden mullet, seabream and trash wrasse. (13)

![Canthaxanthin](image)

**IUPAC name:** β,β-Carotene-4,4'-dione

**Other names:** Cantaxanthin, Cantaxanthine, Canthaxanthine, Lucantin red (BASF), Lucantin Red CWD (BASF), Carophyll Red (DSM), Roxanthin Red 10 (Adisseo), L-Orange 7g, C.I. Food Orange 8, E161g, 2,4,4-Trimethyl-3-[(1E,3E,5E,7E,9E,11E,13E,15E,17E)-3,7,12,16-tetramethyl-18-(2,6,6-trimethyl-3-oxo-1-cyclohexenyl)octadeca-1,3,5,7,9,11,13,15,17-nonaenyl]-1-cyclohex-2-enone

<table>
<thead>
<tr>
<th>Properties</th>
<th>Value</th>
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</thead>
<tbody>
<tr>
<td>Chemical formula</td>
<td>C_{40}H_{52}O_{2}</td>
</tr>
<tr>
<td>Molar mass</td>
<td>564.82 g/mol</td>
</tr>
<tr>
<td>Appearance</td>
<td>Violet crystals</td>
</tr>
<tr>
<td>Melting point</td>
<td>211 to 212 °C (412 to 414 °F; 484 to 485 K) (decomposition)</td>
</tr>
</tbody>
</table>

**HARMFUL EFFECTS:**
Although the amounts used are very small, tests have shown greater quantities of canthaxanthin can cause retinal damage. FSSAI suggested that the permissible limit of canthaxanthin in food items is 200mg/kg and the INS No. is 161 g. (14)

CONCLUSION

Most of these chemicals that enter our environment are manufactured by the chemical industry and added to the thousands of items in daily commercial that support our modern lifestyle. Under our current system, thousands of toxic chemicals have been “grandfathered” in without adequate health & safety testing. Government is handcuffed with undue burden to prove harm before any precautionary actions can be taken to prevent chemical exposure. If this system works, we would not find hazardous chemicals in people’s bodies. Furthermore, we should know the FSSAI rules & regulations (16)(17) about the food additives added in the food products. From the help of FSSAI we should identify the permissible limit of the food additives. From that we can choose our food products in a pure and natural way neglecting the Worst Offenders added in food items.

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