

# Coagulant & Anticoagulant

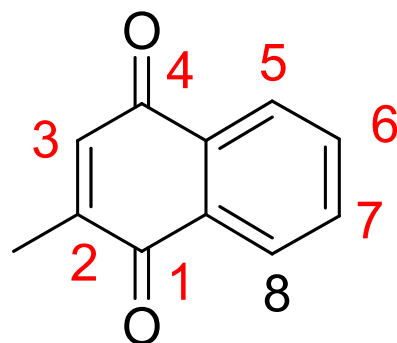
Dr. Gopal Krishna Padhy  
Assoc. Professor  
Centurion University of Technology and  
Management

## Introduction

❖ Anticoagulants prevent the development of the coagulation process of blood. Therapy using anticoagulants is first and foremost directed at preventing the formation of clots in blood vessels, which are the main cause of death in thromboembolic diseases.

❖ Anticoagulants are subdivided into direct-acting coagulants, i.e. those that have an effect on coagulation factors directly in the blood, and indirect-acting coagulants, i.e. those that have an effect on factors of synthesis or blood coagulation in the liver.

## Menadione

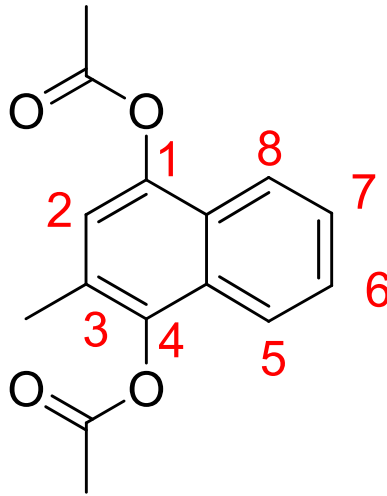


IUPAC: 2-Methyl-1,4-Naphthalenedione

**MOA:** Menadione (vitamin K3) is involved as a cofactor in the posttranslational gamma-carboxylation of glutamic acid residues of certain proteins in the body. These proteins include the vitamin K-dependent coagulation factors II (prothrombin), VII (proconvertin), IX (Christmas factor), X (Stuart factor), protein C, protein S, protein Zv and a growth-arrest-specific factor (Gas6).

**Uses:** The primary known function of menadione is to assist in the normal clotting of blood, but it may also play a role in normal bone calcification.

## Acetomenadione

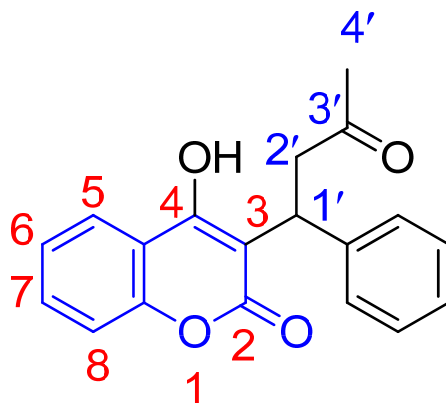


IUPAC: (4-acetyloxy-3-methylnaphthalen-1-yl) acetate

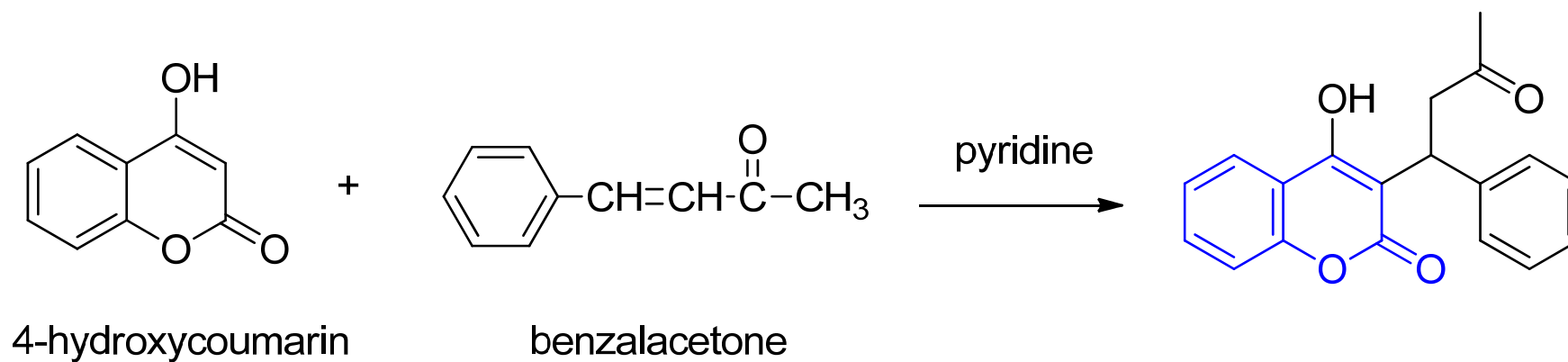
MOA: It is a prodrug of acetomenadione. The active form Menadione (vitamin K3) is involved as a cofactor in the posttranslational gamma-carboxylation of glutamic acid residues of certain proteins in the body. These proteins include the vitamin K-dependent coagulation factors II (prothrombin), VII (proconvertin), IX (Christmas factor), X (Stuart factor), protein C, protein S, protein Zv and a growth-arrest-specific factor (Gas6).

Uses: Acetomenadione is used in the treatment of nutritional deficiencies.

# Warfarin



IUPAC: 4-Hydroxy-3-(3'-oxo-1'-phenylbutyl)coumarin

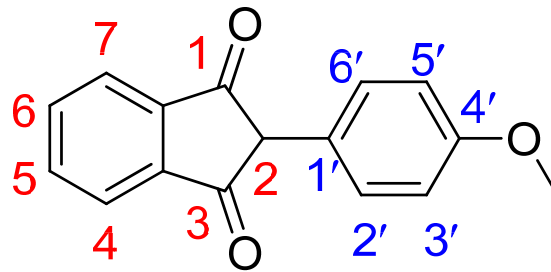


**MOA:** Warfarin is a vitamin K antagonist which acts to inhibit the production of vitamin K by vitamin K epoxide reductase. The reduced form of vitamin K, vitamin KH<sub>2</sub> is a cofactor used in the  $\gamma$ -carboxylation of coagulation factors VII, IX, X, and thrombin. This is particularly true in the case of thrombin which must be activated in order to form a thrombus.

**Uses:**

1. Prophylaxis and treatment of venous thromboembolism and related pulmonary embolism.
2. Prophylaxis and treatment of thromboembolism associated with atrial fibrillation.
3. Prophylaxis and treatment of thromboembolism associated with cardiac valve replacement.
4. Use as adjunct therapy to reduce mortality, recurrent myocardial infarction, and thromboembolic events.

## Anisindione



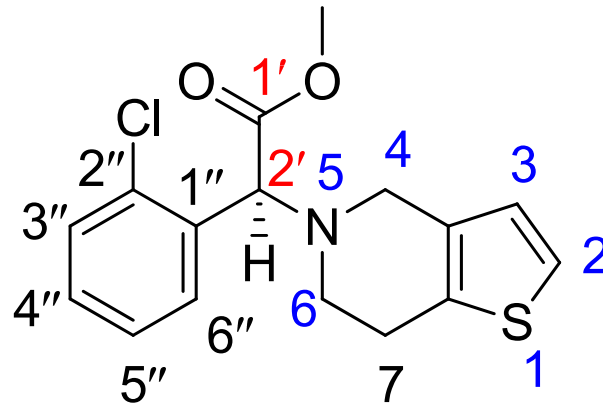
IUPAC: 2-(4-Methoxyphenyl)-1H-indene-1,3(2H)-dione

**MOA:** Anisindione exercises its therapeutic action by reducing the prothrombin activity of the blood. By inhibiting the vitamin K-mediated gamma-carboxylation of precursor proteins, the formation of active procoagulation factors II, VII, IX, and X, as well as the anticoagulant proteins C and S is prevented. Anisindione has no direct thrombolytic effect and does not reverse ischemic tissue damage, although it may limit extension of existing thrombi and prevent secondary thromboembolic complications.

Uses: For the prophylaxis and treatment of venous thrombosis and its extension, the treatment of atrial fibrillation with embolization, the prophylaxis and treatment of pulmonary embolism, and as an adjunct in the treatment of coronary occlusion.



# Clopidogrel



IUPAC: methyl (2S)-2'-(2''-chlorophenyl)-2'-{4H,5H,6H,7H-thieno[3,2-c]pyridin-5-yl}acetate

MOA: Clopidogrel is metabolized to its active form by carboxylesterase-1. The active form is a platelet inhibitor that irreversibly binds to P2Y<sub>12</sub> ADP receptors on platelets. This binding prevents ADP binding to P2Y<sub>12</sub> receptors, activation of the glycoprotein GPIIb/IIIa complex, and platelet aggregation.

Uses: Clopidogrel is indicated to reduce the risk of myocardial infarction for patients with non-ST elevated acute coronary syndrome (ACS), patients with ST-elevated myocardial infarction, and in recent MI, stroke, or established peripheral arterial disease.