ENZYMATIC REACTION OF BETULINIC ACID WITH ACYL CHLORIDE: SYNTHESIS OF ANTI-CANCER COMPOUND

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JULY 2011

Tarikh : 11 Julai 2011
No. Fail Projek : 600-IRDC/ST/FRGS.5/3/1336
Kod Projek : 02-01-01-SF0048

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LAPORAN AKHIR PENYELIDIKAN "ENZYMATIC REACTION OF BETULINIC ACID WITH ACYL CHLORIDE: SYNTHESIS OF ANTI-CANCER COMPOUND"

Merujuk kepada perkara di atas, bersama-sama ini disertakan dua naskah laporan akhir bersama satu salinan soft copy bagi penyelidikan eScience bertajuk "***Enzymatic Reaction of Betulinic Acid with Acyl Chloride: Synthesis of Anti-Cancer Compound***".

Segala kerjasama dan perhatian Y. Bhg. Prof., saya dahului dengan ucapan terima kasih.

Sekian

Yang Benar,

PROF. MADYA DR. YAMIN YASIN
Ketua Projek

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CHAPTER I

INTRODUCTION

Betulinic acid, 3β-hydroxy-lup-20(29)-ene-28-oic acid (1), is a natural product which can be isolated from several genus of higher plants. Betulinic acid has been shown to exhibit a variety of biological activities. It was found to be an excellent anti-tumor agent due to its unique in vitro and in vivo cytotoxicity profile. Betulinic acid was also found to have activity and inhibition against human immunodeficiency virus (HIV) replication in lymphocyte cells, blockage of HIV-1 entry into cells and cytotoxicity against a variety of cultured human tumor cells (Bringmann *et al.*, 1997).

Betulinic acid has three potential modification sites (C-3, C-20 and C-28) to yield derivatives. Darrick *et al.* (1999) reported that betulinic acid derivatives showed improved water solubility as well as selective cytotoxicity by coupling of betulinic acid with a series of amino acids at the C-28 position. Modifying the parent structure of betulinic acid can also improve antitumor activity against various cancer cells (Pezzuto *et al.*, 1999). There are several reports on the preparation of betulinic acid derivatives by using chemical catalyst such as solid acids, clay minerals or inorganic catalyst (Bringmann *et al.*, 1997, Li *et al.*, 1998). These processes however were carried out at high temperatures (>100°C) and high concentration